Why Architects Draw

Edward Robbins

Interviews with

Edward Cullinan *Edward Cullinan Architects*
Spencer de Grey *Sir Norman Foster and Partners*
Jorge Silvetti *Machado & Silvetti Associates*
Renzo Piano *The Building Workshop*
Alvaro Siza *Alvaro Siza Architect*
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with a new preface by the author

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Preface

Since MIT Press first published *Why Architects Draw* in 1994, much has changed in the way architects visualize their projects through mostly drawing—graphically representing by lines an object or idea, a sketch, plan, or design—especially with the move to a reliance on digital media. Drawing has remained the crucial instrument of architectural creation and realization. If the techniques architects use to visualize have changed, the method they use to design has not.

Digital media, like computer-aided design and other drafting software and digital applications, have come to dominate architectural offices. In 1994, it would have been accurate to say, as I did, that when visiting architectural offices one would see people "sitting or standing at the various desks and tables often littered with paper" drawing (p. 2). These drawings would range from the rough and freehand to the rigorous, formal, and hard-edged. Today it is more likely that when entering architecture offices we would see designers sitting or standing in front of computer terminals.

These new digital techniques have undoubtedly offered new possibilities for the creation, development and realization of architectural designs. Whereas drawing from at least the fifteenth century allowed designers to work off-site and send their designs to the site for realization; the computer has reduced the space/time distance of practice. Today designers and others involved in the creation of building can cooperate in real time using the same drawings and changing them together at the same time if necessary. Clients can view designs at home without the designer being present and can add to the designs without destroying the original. And while clients, consultants, and contractors may change and erase digital drawings, it is more straightforward than in the past for architects to edit these changes. Digital media have also provided tools that allow for greater levels of precision in visualization and documentation adding to the efficiency with which designers can produce drawings for complex designs, e.g., hospitals, airports. Using digital media offices today can go between two-dimensional renderings in digital form to printed three-dimensional models, which allows for a more direct and efficient test of their designs. Augmented reality allows architects to see their designs in three dimensions, in context, get a fuller sense of volumetric nature of the buildings spaces, and provide a seemingly three-dimensional contextual sense of the project to clients. Through digital media too, designers are now able to analyze more exactly and visualize the effects of such things as wind patterns previously problematic.

Yet whether created by hand or through digital media, drawing is still at the heart of architectural design. It still is as Rayner Banham noted the mark of true architect. Drawing today as it was in 1994 still plays the pivotal role in the conceptualization, development, realization, and formalization of an architectural idea. It serves as inspiration for an idea, a basis for an internal dialogue between architect and their idea and as a record of that dialogue. It also forms the basis for developing, testing, and even transforming design ideas as the process moves from the initial creative spark to the actual creation of a full-blown design. Finally, as the formalization of the design idea, drawing provides a baseline for the final realization and eventual production of the design. Drawing is also a critical means of architectural communication, be it between the architect and their client, engineers, contractors, and even the media. Drawings also guide the actual construction of the material object.

As I argued in the book, and most important, drawing is a central tool for the architect to hopefully control the process of design negotiation with clients, and the public. It is a way of engaging and defining that discourse through a medium that the architect knows best. In a world where architects have little or no power, drawing still is the one instrument that the architect can use to at least attempt to enforce their control. In 1994, I also argued that if you know who does the creative, development, or production drawings and at what stage of the design, you have gone a long way toward understanding the social hierarchy of an office. Today that would still be the case. And, today as in 1994, the limits of drawing both as a design tool and as a transparent means of communication with clients that I raised in *Why Architects Draw,* e.g., client manipulation, the emphasis on form and aesthetics over social practice and use among others, still holds.

So for me the issues first raised in *Why Architects Draw* about the social responsibility of the architect, the limits that drawing potentially places on the imagination, and the nature of the give and take between architect and client and architect and society when mediated through drawing still remain and demand greater mutual understanding and more informed dialogue. As I argued at the end of the book, the way architects use and understand the new media for visualization and how society will allocate social responsibility to those actors who deal with the relation of the virtual, be it visualizing on paper, or digitally, demands critical examination. As I said then, "A dialogue about drawing among architects and between architects and others is a crucial place to begin" it still is (p. 301).

Edward Robbins

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I cannot thank John Myer too much, for he was the first architect I interviewed about the role of drawing and his work was central to the first published paper I wrote about the issue. His honesty and insights about his own practice set me on the path that eventually led to this book.

Peter Rowe's and Robin Evans's critical readings of the text kept me honest and forced me to be self-critical in ways I would have liked to avoid, but which made this a more interesting project. William Mitchell, Howard Burns, and Don Schön all gave willingly of their time and provided critical readings of the text. My endless pestering of Alistair McIntosh and David Friedman and their willingness to participate in long discussions about drawing were of inestimable help and allowed me to learn things that I could not have otherwise. Alistair also generously provided most of the drawings in part I. Lebbeus Woods graciously provided me with one of his elegant drawings for a discussion with which I am not sure he was in agreement. Michael Hays, Clive Dilnot, and Carolyn Constant offered a number of helpful suggestions. John Biln and Nader Tehrani, both students of mine, kept after me to refine my ideas and also to listen to the architects as well as look at drawing. Their

continual challenges kept me open and hopefully honest to the goals of this work. Chris Monson, Scott Ogden, and Ed Reynolds as well as Theresa Genovese and Brigitte Desrochers were students without whose help this work would never have been completed. Others who read parts of the work and offered critical insights were George Lipsitz, Elizabeth Meyer, and Jacqueline Tatom. With all this help, the errors of fact and analysis that might remain are still mine.

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I The Social Uses of Drawing:

Drawing and Architectural Practice

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The Social Uses of Drawing

Visit an architecture office during its working hours and, probably, what we would see is a workroom with large drawing boards, a reception area, conference rooms, computers, possibly a model shop, and of course people working. Most of these people, though, would not be working at the computers or the model shop, nor would they be in the various meeting rooms. Rather, they would be either sitting or standing at the various desks and tables, often littered with paper, drawing. The drawings being produced would include early conceptions for a design project sketched out in notebooks or on sheets of paper; drawings developing ideas conceptualized in previous drawings; and drawings representing developed ideas produced in such a way that they can be used by builders to realize the design of a building. In appearance, the drawings would range from the rough and freehand to the rigorous, formal, and hard-edged. They might be plans, sections, elevations, perspectives, axonometrics, or some other composite drawing of a building or its parts.

As we roamed through the office, we would see various individuals talking about, or even to, the drawings, or using them to illustrate a point; or they might be drawing quietly by themselves. At times, while talking, one architect might draw on a sheet of paper that someone else had drawn on previously to make a point or to suggest a change. A group of architects, at other times, might be seen talking and drawing at the same time and on the same or different sheets of paper while exchanging or developing their ideas. A senior member of the office might sit down with a junior member in the office and talk about a drawing that junior member had produced. The senior architect might even overdraw on the original or make verbal suggestions that the junior member would note. When the senior in the conversation left the desk, what we would probably see is the junior member literally going back to the drawing board.

If we attended a meeting where our architects met with others, such as engineers or builders, who are necessary partners with the architect in the realization of a building, drawings would be used to communicate what the architects wanted others to understand about their design. On the building site, project architect, contractors, and workers in the building trades would all be working from drawings provided for the most part by the architect whose office was responsible for the design of the building.

When we go to architects for advice or consultation, more often than not they will draw in response to conversations we are having with them. The drawing is used to communicate or record ideas as they are brought up in the conversation. Drawings are used also to illustrate points the architects are trying to make; to suggest various points of view or approaches to the problem; to educate us, the clients, about how the architects intend to respond to a request we have made, or to cement an agreement about what is expected from the architects or what the design agreed upon will look like. During the conversation, the architects would probably sketch out their ideas or might offer us sketches of our own ideas. They probably would suggest we go home and think about the drawing they have made for us or aver that with the conversations they have had with us in mind, they will go back to their drawing boards in order to rethink the project for presentation to us when next we meet.

At these architectural presentations, it is most common to be presented a series of drawings of various kinds, depending on the stage of the design and our involvement in it. While some architects provide us with models, presentations almost always involve verbal communication, with the drawings serving to direct, order, clarify, and record ideas that come out of the conversation. As an agenda and a mnemonic, a form of dialogue as well as a visual guideline, the drawing serves as both the subject of conversation and the object of our endeavors. The drawings to a great extent also serve to frame and structure the social interaction we have with the architect.

We probably would observe drawings used in a similar fashion in an architectural school if we were provided the opportunity to visit one and watch what transpired there. Classes in theory, in history, and in structure, among others, would be held each day. However, the longest part of each day would be spent in what is called "studio," where the student learns to design.

While in studio, students would, for the most part, work on design projects at their desks. Just as in design offices, these would be full of drawings of various kinds. Drawings would also be pinned up on walls and boards surrounding each desk. We would see the instructor working with a student, giving what is called a "crit" and often drawing on the same sheets of paper on which the student has drawn a design.

At various points in the semester, if we were visiting at the appropriate time, we would see student presentations and reviews. At these reviews, each student, or each student group if they were working in groups, would pin up drawings of the work completed so far and would give a short verbal presentation referring to the drawings that had been pinned up. Critics, usually faculty or visiting architects, would then give criticisms, suggestions, and praise for the various projects. They would do so by referring to what the students had said; more commonly, though, the critics would refer to the drawings that had been pinned up. While models, maps, photos, and other visual information might be provided by students, the drawings are the most common currency of student-teacher exchange.

Read the many architectural periodicals available today, or peruse the many architectural books being published, and we would find drawing an important part of this world as well. Articles on buildings provide not only photographs of the building and its many parts but also drawings that illustrate various aspects of the design process. Conception and development of the design are most usually illustrated through drawing. Most articles about theoretical aspects of architecture consist of words and drawings. At times drawings alone are used to express the ideas of important architectural theorists.

When we look at architectural practice today, even if only in a cursory way, we find that drawing plays many and even contradictory roles. On the one hand, it is crucial to the cultural conceptualization and manifestation of a design. The drawing is pivotal to arriving at a sense of the design and to mastering all the intricacies of a final work of architecture. It also provides a common mode of discourse with which to deal with the many, varied and complex aspects brought to an architectural project by the many different actors who are a part of any architectural making. On the other hand, drawing is used to order and structure the social interactions and social relations of the many actors who participate in a design project. It sets social hierarchies, defines a social agenda, and provides an important instrument through which the social production of architecture is organized.

There are a number of ways of looking at architectural drawing. We could see it as a representation or a language, or deconstruct it as a form of signification or text or see what ideas each drawing embodies. To look at drawing in these ways certainly is critical to any understanding of what drawing is and what role it plays in the creative and communicative processes that architecture entails. As important as these issues are, however, they do not address the way drawing embodies attitudes about cultural and social practice in architecture. Nor do they allow us to see how and in what way drawing is used in the social production of architecture.

Approaches that address drawing as a representation or as an idea and analyses of drawing as an instrument of social practice are each necessary to a full understanding of architectural drawing.[1] While intimately connected, neither of these approaches is reducible to the other; each requires that we ask a different set of questions and each defines a different set of concerns. This book's particular interest is in drawing as a bridge between different aspects of architectural practice. It looks at the way drawing provides the framework that connects the cultural creation of architecture to its social production. Architectural drawing has many effects, serving as it does to join concept to its materialization and the architect as cultural creator to the architect as social practitioner. Drawing both produces architectural knowledge and is a production of that knowledge; it both guides social practice and is guided by social practice. As a result architectural drawing must be understood from a variety of perspectives.

An underlying premise of this book is that, while the analysis of the social uses of architectural drawing should run parallel to discussions of drawing as a mode and language of representation, we cannot claim to adequately understand how an architectural drawing means outside of its effects. It is through the effect of a thing, such as drawing, as an impression produced on someone or as a consequence of an action that a thing becomes important. Thus architectural drawing in this view must be understood as a human and therefore social practice first and an object second. It is as a practice that architectural drawing first impresses and produces consequences.

Nonetheless, another and somewhat different underlying premise is that our understanding of a cultural and social practice is best served by a dialogue between those who are exterior and those who are interior to this practice. On the one hand, the outsider brings a crucial and even necessary viewpoint to any understanding of the practice of others. As M. M. Bakhtin has argued about understanding another or foreign culture:

> There exists a very strong, but one-sided and thus untrustworthy, idea that in order to understand a foreign culture, one must enter into it, forgetting one's own, and view the world through the eyes of this foreign culture. . . . Of course, . . . the possibility of seeing the world through its eyes is a necessary part of the process of understanding it; but if this were the only aspect of this un-

> derstanding, it would merely be duplication and would not entail anything new or enriching. . . . In order to understand, it is immensely important for the person who understands to be *located outside* the object of his or her creative understanding. . . . Our real exterior can be seen and understood only by other people, because they are located outside us in space and because they are *others*.[2]

On the other hand, the outsider must see and hear the world of the other he or she studies and allow the voice of the other, the insider, to be a part of the understanding of that culture.

Given these premises, the book addresses a number of questions. What role does drawing play in joining conceptual practice to social practice in architecture? How might the uses of drawing in architectural practice be understood from the perspective of a social scientist looking at architecture as an outsider? How do architects, as insiders to architectural culture and society, themselves depict the uses of drawing in their own practices? Are there aspects of drawing that remain hidden to architects because of their cultural biases? Conversely, are there aspects of drawing that remain hidden from the social scientist because of his or her interests and biases?

This book is directed to these questions in two ways. First, through a discussion of the uses of drawing by the author, an anthropologist who has worked with architects and taught architectural students for over fifteen years. Second, through a series of narratives based on interviews with ten architects and a structural engineer, in part II of this book, which look both at their understandings of how they use drawing in their own practice and at the actual drawings used in a design of their making.

Because anthropologists have a different and exterior way of looking at architecture than do architects and because each profession uses its own language to describe what it understands, no attempt has been made to translate the architect's language into that of the anthropologist or the anthropologist's language into that of the architect. Rather, in order to encourage dialogue, the participants are left to speak, as much as possible, in their own voices. As a result, the reader will find a rich variety of understandings of the uses of drawing. The narratives range from descriptions of office management to analyses of the very nature of design and design practice itself—all of which to some degree are embodied in the act of drawing.

Most important, this book is offered as a beginning to a dialogue about drawing in which no single voice, that of the anthropologist or of any particular architect, is given the final word. Its goal is to set out a number of positions in order to broaden the discussion by architects and nonarchitects alike about how drawing might be perceived, how drawing might be used, and how those perceptions and uses might be understood.

The Drawing, Society, and Culture

Drawing of images has been a part of human cultural production for a very long time. If evidence from hunting-gathering societies is any guide, people drew before they built. As ritual image, as sympathetic magic, and as storytelling, drawing has served as a totem, a palladium, a mnemonic, and as an important instrument of human creative practice.[3]

As a symbol, drawing has a dual and contradictory nature. Materially constituted, drawing is the phenomenal representation of a conceptual practice. It is a vision or idea delineated on a surface, usually paper. Once constituted phenomenally, drawing can be and often is seen as autonomous of its production. For example, a drawing produced for a religious ritual can itself become an object of power and worship. Drawing, at the same moment that it represents a conceptual production and practice, can also provide a code or template that guides the social production of the object it represents. Many of us do this when we use drawings that we sketch onto solid objects to make something.

Drawing is at once an idea and an act, an autonomous concept and a mode of social production. It is both a mute object and a form of social discourse. We can look at a religious drawing as a work of art or it can be an icon intimately involved with religious ritual or individual prayer. Drawing, as idea and as act, embodies within itself the relation between society and culture, the relation between realization and imagination, and the relation between object and subject. As such, immanent within drawing are all the possibilities that this relationship offers to us and all the contradictions and conflicts that it forces upon us. As Gerhard of Brugge argued, if somewhat hyperbolically, over three hundred years ago: "The art of drawing . . . may justly be called a bearing mother of all arts and sciences whatever. . . . The art of drawing is the beginning and end, or finisher of all things imaginable."[4]

If we are to argue that drawing is both a cultural and a social instrument, it is important to distinguish here what is meant by culture and society. Culture, as Raymond Williams points out, is "one of the two or three most complicated words in the English language."[5] For us, the concept refers broadly to subjective intellectual, aesthetic, and artistic practices. In contrast, society denotes "the body of institutions and relationships within which a relatively large group of people live."[6] Clearly, in our world, culture exists within an institutional context that both supports subjective intellectual and artistic production and defines its limits and its practical forms. But as Zygmunt Bauman suggests in his *Culture as Praxis,* whatever the limits imposed by society's structures,

> culture is the only facet of the human condition . . . in which the knowledge of human reality and the human interest in self-perfection and fulfillment merge into one. The cultural is the only

> knowledge unashamed of its partisanship and ensuing bias. It is . . . bold enough to offer the world its meaning instead of gullibly believing (or pretending to believe) that the meaning lies . . . complete and ready to be discovered.[7]

If society is the apparently objective, seemingly unyielding and intractable web of everyday institutions, rules, and social forms, then culture is in a sense its opposite. Culture is the manifestly subjective and tractable everyday world of visions, ideas, and the infinitude of possibility defined by our capacity to symbol. Each, society and culture, is entwined with the other, each is supported by the other, and each is mutually productive of the other, even if, at times, they are in conflict.[8]

Within architectural practice, drawing as a pure cultural conception and cultural production defines a world free of any institutional, political, or economic constraints. It can reveal, and even revel in, its own biases and notions about perfection, utopia, or any other theme it chooses to address and represent. The drawing can be used to invent cities that have never existed, building types that may well not be buildable, and visions of space that we have yet to and may never encounter in our everyday lives. Drawings can produce architectural objects unfettered by the exigencies of cost, social custom, and regulation.

At the same time, the subjective searching that architectural drawing is used to represent is constrained, to the extent that the conception is to become a built object, by the institutions, economies, and politics of production in which it is to be realized.[9] When used to realize a subjective idea as a built object, drawing becomes as much a practical, objective, and social instrument of the material production of building as it is a conceptual, subjective, and cultural representation of an architectural creation. Drawing's power and its importance to architects emanates from its complex and dual nature.

Architectural Drawing: The Issue

While the discussion of society and culture is, or at least should be, a commonplace, we need to be reminded of this complex relationship. Our concern with drawing as a representational form and the emphasis we place on issues of provenance, and on what the drawing means or represents, often blind us to the role drawing plays as an instrument of social practice. As Robin Evans has argued when dealing with the issue of drawing as architectural representation: "Drawing in architecture is not done after nature but prior to construction; it is not so much produced by reflection on the reality outside drawing, as productive of a reality that will end up outside drawing."[10] Whether or not we choose to recognize how the drawing is used to connect the cultural act to its social production, drawing does serve, nevertheless, to join the creations of the architectural imagination with the institutions of architecture's material production.

As Roland Barthes has aptly argued, when "things go without saying"[11] in any area of human discourse and practice they become a powerful social mythology. The power of this mythology emanates from the established social order represented in it and the capacity of the thing that goes without saying to blind us to its own social production. The presumptions that remain hidden behind the myth need to be separated from the practices they may mask. Without this separation, the possibility for the creation of transformative or liberatory forms of knowledge or practice remains remote.

If we were to examine all the things that go without saying about architecture, some of our favorite presumptions might be challenged. Ironically, the literature's silence about the social uses of drawing may reveal more than it hides. There may well be a fear that to reveal the more mundane aspects of drawing, which at one level represents the most creative and culturally critical aspect of architectural practice, might undermine the architect's place in the world. If the instrument of architects' creative powers also serves as the practical instrument through which they produce themselves as social actors, their status as creators and makers might be compromised. It is the view of this author, however, that the complex role of drawing in architecture manifests the architect's extraordinary skill in uniting the artistic and cultural with the social. Nothing is undermined by understanding this. Rather, we are apt to appreciate more fully the complex challenges the architect faces.

Until we unravel the complex relations embodied in the use of drawing and understand its effects on the social and cultural divisions in the production of architecture, we cannot speak with any certainty about its effects on architectural practice. We cannot say how the use of drawing limits architectural practice, nor how it may provide new and better ways to realize even greater potential within that practice.

The social division of labor through which architectural conceptualization and production is realized may have much to say for it. Until we look at the assumptions that are hidden within it, however, we cannot understand how or why. While there is much discussion of the field of architecture as an institutional and social practice,[12] there is little or no discussion about what role drawing plays in that practice. Nor is there any discussion of whether the medium of the practice, drawing, joins the artistic and creative acts of architecture with its social production, or of how it does so if it does. As E. L. Eisenstein argues, "When ideas are detached from the media used to transmit them, they are cut off from the historical forces that shape them."[13]

It is my contention that by examining how architects use drawing in the social production of their architecture, we can begin a tearing away of architectural masks. Having torn away the masks, we can begin, and only begin, what should become a long and fruitful dialogue about how the architect and how architecture is realized as a cultural production within the social fabric of its making.

Drawing in History

Before we examine the uses to which architectural drawing is put today, we need to focus briefly on architectural drawing in historical perspective. What we discover is that the uses to which drawing has been put over time have been associated with the transformation of the cultural and social organization of architectural practice. From the ancients through the Middle Ages, shifts in the use of drawing presaged subsequent changes in the way architecture was produced. These changes culminated in the new cultural and social status accorded the gentleman architect of the Renaissance. This last transformation of the architect from craftsperson to artist was accompanied and, arguably, made possible by the new centrality and importance of drawing as a critical instrument of architectural creation and production.

An examination of the history of architectural drawing reveals also that, rather than a universal and transhistorical attribute of architectural practice, the use of drawing in architecture as we know it today is relatively recent and historically situated. As important as drawing is to contemporary architectural practice, it is not a function of some inevitable process of architectural thought or action. It is the result of choices architects made at a particular time in their history, which were made for a variety of reasons and which have had a number of important implications for both architectural creation and the organization of architectural practice.

In Egypt, remains of drawing fragments provide some information about the use of drawing in architecture.[14] There were ground plans based on squared grids, pictorial images of the building, and even sketch plans incised on flat flakes of limestone used as working guides for foremen on the job. Actual production was based on a mix of working from drawings and working with actual projections done to scale with cords and stakes on site. How much the architect remained on site throughout the project is not known. It is clear, however, that the architect was not yet entirely freed from the site through the exclusive use of drawing.

There is considerable debate about the techniques used by the ancient Greek architect. Coulton argues that most of the Greek architect's work involved the practical aspects of building during construction; "nevertheless, this emphasis on the practical aspects of the Greek architect's work does not mean that he had no responsibility for the design."[15] Drawing, in Coulton's view, had no part in the process of either design or construction. Kostof agrees with Coulton, suggesting that "the central agent of the art of architecture was the stone-mason, and he worked from the detailed verbal descriptions set down by the architect, usually referred to as *syngraphai*."[16] While there are references in Greek documents to what are called *anagrapheis,* Kostof accepts Bundgaard's[17] argument that this term refers more to descriptions as specifications than to drawing. Nonetheless, Kostof goes on to argue that drawing must have been a part of Greek architectural practice on two grounds. First, the refinement of the elevations "would be extremely difficult to achieve without preliminary drawings to scale."[18] Second, the Latin author Vitruvius explicitly speaks about the role of graphics in ancient design.

The discovery by Lothar Haselberger of a series of what he calls "blueprints etched in stones" for the construction of the temple at Didyma would appear to support Kostof's suggestion about drawing in Greek architecture. For Haselberger, "It is clear that these working drawings were used to elaborate the component parts of the temple in an often highly involved process of design."[19] Discoveries at the temple unearthed not only drawings to scale but scaled-down sketches of architectural elements like pediments. Evidence from Vitruvius, from other Roman histories, and from mosaics suggests an important role for drawing in the design and making of Roman architecture as well.[20] The plan, the elevation, and what Vitruvius called the perspective were widely used by the architect and patrons alike in their interactions.

Nonetheless, whatever the role of drawing in ancient architecture, it was still not a dominant instrument of design nor had it yet freed architects of their craft responsibilities. Drawing was one technique among others that architects used in crafting the design for the making of the building for which they were responsible. Geometry, not drawing, was more important for solving the most serious problems of a design. As Vitruvius stated: "By his [the architect's] drafting skill he will readily be able to make drawings to represent the effect desired . . . but the difficult problems of design are solved by geometrical rules and methods."[21]

Similar evidence on a more popular level comes from the Acts of Thomas in the New Testament Apocrypha, going back to at least the third century A.D., where there is a description of a carpenter disciple of Jesus being commanded to build for his king: "And the king took him . . . and began to speak with him on the way concerning the building of the court house, and of the foundations. . . . And the king said: If this then seem good to thee, draw me a plan, how the work should be. . . . And the apostle took a reed and drew."[22] In this text, the architect is still mainly a carpenter, i.e., a craftsperson for whom drawing constitutes only a very small part of his contribution to the project. Indeed, the reference to drawing here may be better translated as "design" and may not mean drawing as we envision it today.

The role of drawing probably did not shift much after the fall of Rome. If anything, its use may well have declined, though medieval architects did use drawing in their work. Lon Shelby, in his various works on the medieval mason, argues that drawing constituted a significant part of the mason's skill but was not crucial either to his self-definition or to his work:

> I believe it still correct to say that in medieval building there was not the ordered progression of modern building practice, from the architectural drawing through the shop drawing to the design and construction of mason's templates. The reason is simple enough: the medieval master mason combined in himself the equivalents of the modern architect, stone contractor, building contractor and construction supervisor.[23]

Moreover, as Shelby has argued elsewhere:

> In spite of the fact that English master masons of the later Middle Ages were developing increasing skills in architectural drawing, they had not yet perfected their drafting techniques to the point where the drawings alone were adequate instruments for directing the masons in the technical processes of construction.[24]

The extraordinary proliferation of very precise technical terms for various parts of the building suggests that means other than drawing had to be used by the master mason to communicate the design to others working on the building. Because technical supervision had to be constant and was for the most part conveyed verbally, the master mason was tied to the site of the building design throughout its construction.

Nonetheless, as Robert Branner suggests, "the techniques used in the various drawings . . . merit special attention since it is here that the processes of thirteenth-century design are laid bare."[25] These processes reveal no overall plan, and according to Branner the design appears to proceed piece by piece, governed only by principles of symmetry and a sense of size. As yet there was no notion, nor was there the possibility, of using the drawing to guide the project in a way that would enable architects to remove themselves from everyday decision making.

François Bucher has suggested, however, that each step of Gothic design was consciously and rigorously planned and that drawings of all types played a significant role in this planning. They ranged from theoretical designs to working plans for buildings, and from sketch plans to quite precise key-plans that carefully correlated all the parts of the building. Drawings of plans for the details of the building, for the location of its parts, and for working out special problems of stereotomy were all a part of Gothic design. Impressive elevations were drawn for the patron and to persuade authorities to build. Drawings were used to raise money for a project and to facilitate the choice between several possible designs during construction. There is even evidence of what Bucher calls "fantastic plans" in this period.[26]

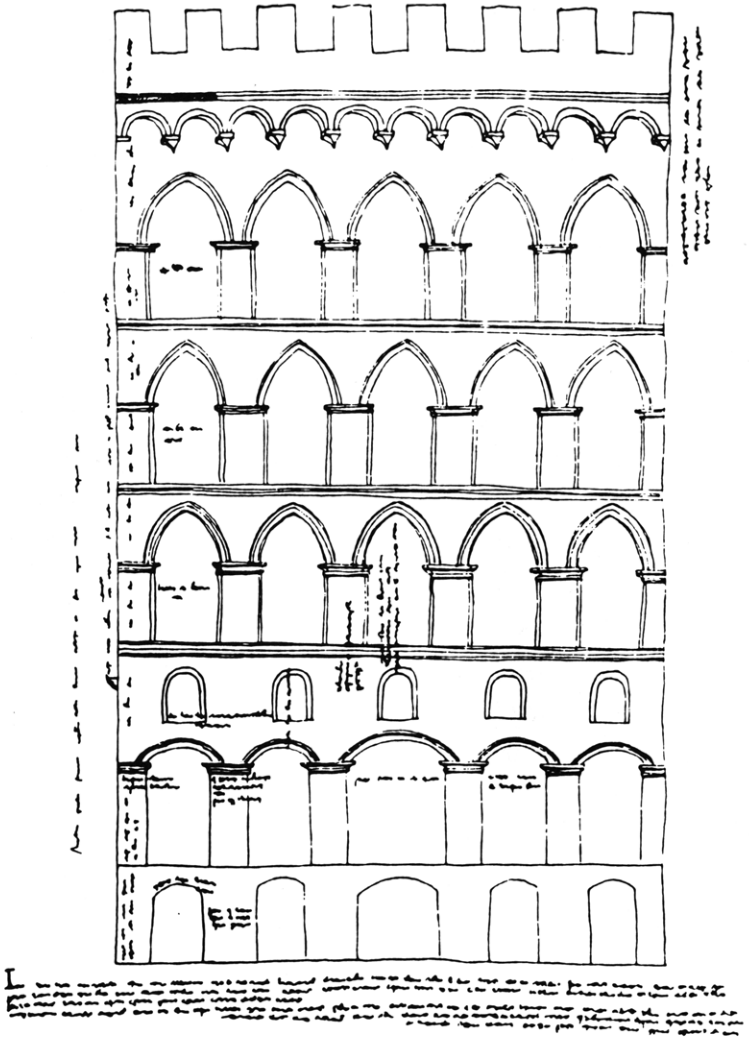
If Bucher is right, drawing, by the Gothic period, had begun to play a more dynamic role in the process of design, a role that begins to resemble that of drawing today. The design, however, was still limited by the geometric canon of Gothic architecture and architects by the social organization of their craft. As Branner points out, it would take a shift from Gothic structural and spatial speculations before the drawing could become a linchpin for design.[27] It would also take new forms of drawing practice before drawing could play a role not only in the redefinition of architectural thought but in the redefinition of the role of the architect as well.

By the fourteenth century, this process of redefinition was beginning to take place. The Sansedoni elevation (figure 1), discovered by Franklin Toker, with its appended drawing, suggests a shift in the way architects worked concomitant with a change in the uses of the drawing.[28] The elevation bears many of the features of the modern working drawing. It is orthogonal, it is drawn to scale, it provides dimensional measurements, and it is accompanied by written notations to guide its realization.

On close examination, some substantial differences between it and more modern drawings become apparent. As Toker illustrates, the drawing is not detailed enough to be used to actually guide and control the production of the building as working drawings do today. There is more information about what is to be put into the building and a more detailed guide of the patron's wishes in the written part of the contract.

The lack of detail in the elevation, and in the written contract as well, reminds us of how considerably the relation of the drawing to construction in the fourteenth century differed from that of today. The degree of variation built into the terms of agreement between patron and builder, and between what is designed before construction and what is not, suggests that there was far greater on-site flexibility and freedom than is the case in current architectural practice. Many, even critical, decisions were left out of the elevation. For example, the bend in the street on which the palazzo sits appeared in no part of the elevation, and shifts in dimension and the properties of important architectural elements like doors and windows were left relatively unspecified. There are no instructions on the elevation as to how one might deal with these issues. Nonetheless, the elevation, appearing as it did on a contract and not autonomously prior to or after the contract's acceptance, was a working drawing of some kind.

If it was not simply a guide to construction, what did the elevation represent? Toker argues that the drawing represents an idea, or a principle of design, rather than an actual working guide to construction. Decisions about construction, as they would be for years to come, were still left to master craftsmen working on site, trusted as these masons and other masters were to work within conventional understandings of architectural form, structure, and expression. When confronted by the exigencies of the site, the masons would shift the building to meet the curve in the site and would decide on other structural and associated issues. What the architect appeared to have expressed in the



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Sansedoni elevation is the nature of the underlying geometries and ideals embedded in the palazzo's design.

As well as a new way of thinking about design, the Sansedoni elevation also represented a shift in the particular organization of labor that had underpinned the design and construction of buildings, and in the statuses associated with this organization in the late Middle Ages. Until drawings of the type represented by the Sansedoni elevation made their appearance, the production of buildings was primarily an on-site endeavor. There is evidence that master masons on a particular project would seek advice from expert builders from distant points and that particular master masons might, at times, be involved with more than one project. For the most part, however, master masons or architects designed, guided, and built on the site of the building to be realized. The evidence provided by the Sansedoni elevation suggests that a new relationship between architect as designer and architect as master builder was developing. As the effort of one individual, the elevation was a crucial element in defining a new and special status for the architect as the conceptual "imager" of the design and the general overseer of the building's realization.

This new form of intellectual practice, according to Toker, was warranted by the written contract and buttressed by the organization of architectural practice in place for the design and realization of the palazzo. Four architects are named as involved in the project. One drew the elevation, one coordinated the work, and two were on-site coordinators—one representing the architects and the other the patron. The combination of drawing and written contract provided the instruments through which the architects could frame a new relation to their projects. Institution of a second-in-command, the *appareilleur,* over the next few centuries finally gave leave to the chief architect to work away from the site and to be involved with several projects simultaneously.

In order to work away from the site, the architect needed a means to communicate the central ideas that would define the project's design. The development of the scaled drawing along with mathematical models for design made such control possible. The capacity of on-site craftspeople to work from drawings, like the Sansedoni elevation, and their ability to assure the realization of the design within the exigencies of the site provided the basis for a new architectural actor, the conceptual designer, and for what Toker calls "design by remote control."[29]

The Sansedoni elevation is one of the few actual drawings that bear witness to the beginnings of a new architectural division of labor and an early, if primitive, attempt at a new mode of architectural practice.[30] The drawing's sparse information reminds us, however, that the architect was not yet able to rely on the drawing alone to define his paramount position in the production of architectural design. He was still constrained by the narrow and conventional designs of his age and by a social organization of architectural making that was still controlled by local craftspeople and local architectural tradition. At the same time, the Sansedoni elevation bears witness to the initial attempts by an architect to escape traditional limitations on his practice. As Toker states, "the relatively primitive working drawings used by Gothic masters encouraged professional specialization but prevented a fixed split between architects and builders. That split would come only with the perfection of the working drawing after the mid-sixteenth century."[31]

Factors other than drawing would be crucial to the development of a new social division of labor within architecture. Drawing would be, nonetheless, a critical instrument that architects would appropriate in the process of making themselves predominantly designers and mind workers. The drawing would be utilized to separate the architect from those who realized the design through their hand work.

Drawing was also beginning, with the Sansedoni elevation, to take on a new importance as an apparently autonomous instrument in the process of architectural design and conception. This separation of conception from realization and the separation of the actors associated with each would in time make possible—with the invention of even more precise drawing types—a whole new architectural discourse. In this new discourse, the idea and its representation would become equal to and even more important than the actual building. In turn, this would further distinguish the architect as designer from the builder. In time, it would create also an architecture of images and formal conceptualization that would rival if not replace the architecture of building among significant actors within the architectural community.

It would be careless to suggest that master masons and those who were called architects prior to the perfection of drawing as a critical instrument in architectural practice did not have ideas. References to the artisan's "idea" do precede such developments; for example, St. Augustine's comparison of the law of all arts to the art of God.[32] Such references, however, were not meant to suggest ideas objectified and realized in some material form. Rather, they referred to the idea as a preformed element of thought.

What we begin to see, though, with the Sansedoni elevation, and with other drawings like it, is more than a mere expression of an idea. Rather, the drawing provides an instrumental basis from which architects could demonstrate that their ideas were the critical and guiding moments in the production of architecture. The self-invention of the architect as gentleman or mind worker, in the Renaissance, would be accompanied by the extended use of the drawing as an instrument of that invention. While we might not want to posit a direct causal relationship here, the increased role of drawing certainly provided a powerful instrumental basis for this new definition of the architect's role.

The transformation of the architect's role would not be rapid. Alberti, by the early fifteenth century, would suggest that the architect must of necessity design while the builder must realize the design; the drawing would guide such a relationship. However, it is not clear that this relationship was as yet instituted. Even though Alberti could argue that "it is the role and function of the drawing to give buildings and parts of buildings a suitable layout; an exact proportion; a proper organization; a harmonious plan, such that the entire form of the construction is borne fully within the drawing itself,"[33] resistance to the new instrument of drawing remained.

Even an architect as important as Brunelleschi could not necessarily rely on his drawings alone to guide the realization of his designs. Manetti, Brunelleschi's biographer, relates that because Brunelleschi had to be away during some of the construction of the Ospedale in Florence, he left a drawn plan with verbal instructions for the workers to follow. As Manetti states:

> He [Brunelleschi] presented a drawing precisely scaled in braccia. . . . In it are many various and fine considerations and the reasons are understood by few. He explained it orally to the master builders, the stonecutters, certain citizens, the leaders of the Guild, and to workers assigned to the undertaking since he had to be absent for a time.[34]

While he was away, Brunelleschi's orders were deliberately ignored, resulting, Manetti goes on to point out, in an inferior building, as the individual who was responsible for the changes in the design must eventually admit. Nonetheless, what we see in this episode is that the role of the architect as the central figure of design and the drawing as his instrument of command have not yet been firmly established.

In the battle for preeminence over architectural design, in the quest for the right to guide design while away from the site, and in the acquisition of gentlemanly status, architects required an instrument that could provide a number of crucial qualities. First, they needed an instrument that would clearly communicate what they wanted to realize without their having to remain on site. Second, they needed an instrument that would allow for the testing of their ideas without necessarily having the opportunity to test them on site. Third, it was imperative that architects use an instrument that would clearly be defined as an intellectual equivalent to writing and mathematics: one that could be used without mess and without significant manual labor. A quotation from Leonardo da Vinci makes abundantly clear how important it was for artists, and by extension architects, to disassociate themselves from craft workers and the process of labor. Da Vinci suggests that painting—the same case could be made for drawing—is gentlemanly while sculpture is not because it can be done in the home rather than in the workshop. While the sculptor labors with hammer and chisel and makes a great mess, "the painter sits in great comfort before his work. . . . He can be dressed as well as he pleases and his house can be clean and filled with beautiful paintings."[35]

All these qualities were met by the instrument of drawing. It would await the sixteenth century's significant improvements in drawing techniques for the drawing to reach its full potential as an instrument of architectural creation and realization. Nonetheless, by the fifteenth century the relation of the drawing to the new role of the architect was already immanent, if not yet dominant, within both practice and theory.[36]

Advances in drawing provided the Renaissance architect with the capacity to express and experiment with a greater range of ideas than did medieval drawing. Medieval architects drew, but their drawings effectively expressed, for the most part, only measure. It was measure that the architect could vary; the rest was borrowed from other buildings. Drawing, by the Renaissance, allowed architects to experiment with the expressive quality of a building. It also allowed them to be more artistic, to express the tone, the style, and the materials as well as the measure of a building in a medium of representation to which both architects and laypersons could respond.[37]

Drawing also played a central role in this period as a means of recording classical buildings and engaged architects in the humanist quest to appropriate the classical. As a form of architectural memory, as a means to communicate this memory, and as an image capable of being reproduced in printed texts, drawing took on a new importance—an importance the model, because it was not easily portable, could not. Drawing grew in importance as it was disseminated in the printed texts so important to the definition of the new humanist learning of the Renaissance.[38] The works of Francesco di Giorgio, Serlio, Palladio, Delorme, and Filarete among others testify to the growing importance of text and the drawings that accompanied it within the transforming social and cultural world of the architect. If Alberti drew very little and Filarete drew a bit more, by the time of Francesco di Giorgio the drawings in a text were often a better and more widely known record of an architect's work than the actual buildings he had produced.

Practically, the invention of new forms of drawing, like perspective and analytic sections and elevations, added significantly to the method by which design was understood and to the means through which design was created. The concept of *disegno,* which referred to drawing, and the drawings themselves were critical. As Francesco di Giorgio argued, "The complete architect needs to use invention for many undescribed cases which occur, and for this he requires drawings."[39] By the fifteenth century, drawings were beginning to replace even models in architectural practice. Working drawings improved so much by the sixteenth century that a building like the Escorial was produced and constructed largely from these drawings. Moreover, in the case of the Escorial, Juan de Herrera felt it necessary to publish his drawings. Drawing was so critical by this period that we find Philibert Delorme instructing masons about the nature of drawing so that they would be able to competently realize the architect's designs. While there is no evidence as to whether Delorme spoke down to the masons about drawing or saw them as inferiors, many architects of the period, following Alberti, did consider masons to be their intellectual and social inferiors, engaged as the masons were in hand work.[40] As early as the late fifteenth century, Francesco di Giorgio would argue in his *Trattati di architettura, ingegneria, e arte militare:*

> Hence, when all the general and special rules have been given, it is necessary to draw some examples, through which the intellect may more easily judge and with greater certainty remember; because examples affect the intellect more than general words, especially the intellect of those who are not expert or learned.[41]

Differences in how each architect used drawing in his design work notwithstanding, it is clear that drawing, as an instrument of memory, self-education, experiment, and communication and as a means to direct the construction of buildings, had become crucial to the architect of the Renaissance. Drawing, by this period, had become so important that Raphael would feel compelled to include a technical discussion of the importance of new forms of drawing in his letter to Pope Leo X.[42] Even in England, somewhat outside the tradition of Renaissance Italy as it was,

> with the appearance and employment of independent designers, sometimes with no training in the building crafts, drawings became the main means of communication between them and the building operatives—an essential link between the conception and realization of design, which indeed they remain today.[43]

Suffice it to say that by the sixteenth century the drawing had become the means by which architects could transform their design ideas into built form. At the same time, they could and did use drawing to aid in directing the transformation of the social division of labor through which architecture was produced. If this process was not complete, it was far on its way to what it would become in the contemporary practice of architecture.[44]

The transformation of the architect's role and status that we begin to witness in the late Middle Ages and that flowers in the Renaissance would be associated with the greater and greater emphasis on drawing, over the next centuries, as architecture became more and more a distinct profession with its own particular status and tasks. With the changes in architectural practice first undertaken in the Renaissance, drawing took hold as the dominant instrument of design and as the symbol of what makes the architect unique. By the twentieth century, at least in the United

States, the transition from builder to self-declared professional architect unfolded "as the transition from 'craftmanship' to 'draftmanship.'"[45] By the twentieth century, drawing would become a natural and universal currency of architectural discourse and social exchange.[46]

Techniques of Drawing in the Modern Age

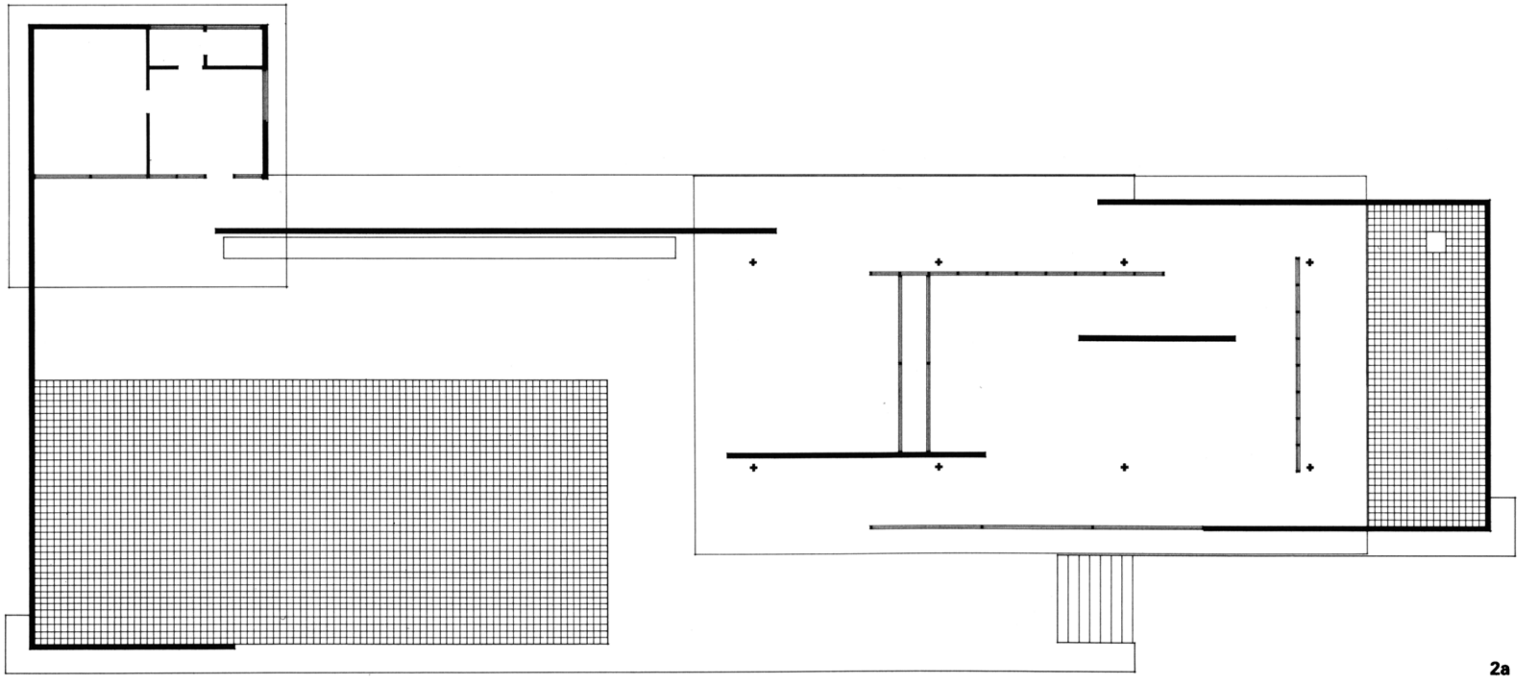
Contemporary techniques of drawing provide a multiplicity of two- and three-dimensional techniques for representing a design. Architects have the capacity, on the one hand, to conceptualize completely new and experimental or even completely visionary or fantastic possibilities on paper using only their own time.[47] On the other hand, drawing provides a conventional basis with which architects can communicate with others in the social production and materialization of a design.

Twentieth-century architectural drawings are generally relational, projective, and geometrical techniques for depicting a three-dimensional object in two dimensions. The different viewpoints offer architects a number of different approaches with which to represent and analyze a design. While this book is not about drawing techniques, a brief discussion of them will provide the reader with a sense of the range of such techniques in the architectural repertory. Not knowing the range of available techniques and what each offers, one might not be aware that architects, in drawing, are revealing something of how they choose to view the architectural object. In fact, what they present is determined neither by some essential relation between the image and the object nor by some underlying or universal logic of design.[48]

Orthographic projection represents a solid object meeting a two-dimensional plane at a 90-degree angle. It is the most commonly used projective drawing in contemporary architectural practice.

There are a number of orthographic projections that are used by architects to describe their designs. Plans (figure 2a) present views of a horizontal slice of the design from above and can represent the patterns and dimensional relationships of a floor or ground plane. Sections (figure 2b) are like plans except that they present a view of a vertical cross section through the building or object being represented and provide a sense of how it works internally. Elevations (figure 2c) are like plans and cross sections except that they deal with the surface of a solid object.

Each of these orthographic projections provides different types of information about the object or building that is being designed and allows the architect to manipulate different aspects of the design. If used in a conventional manner, they become the basis for the realization or "working" drawings that will be used by builders to construct the architect's design. When used to think about design, they vary significantly in their degree of abstraction and the kinds of architectural issues that they address. Given that each of



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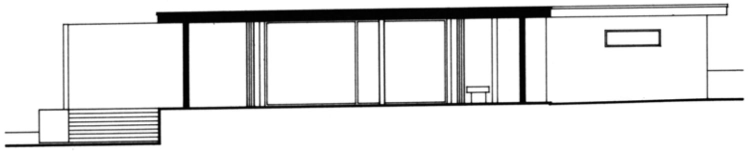

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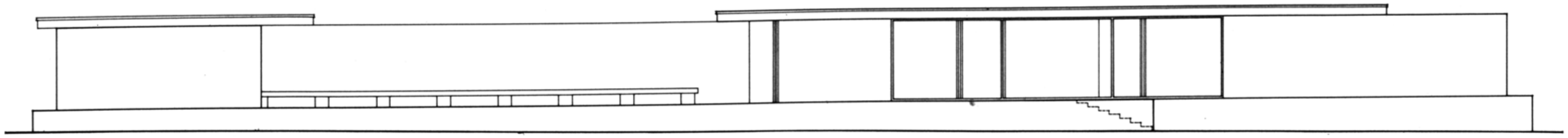


2c

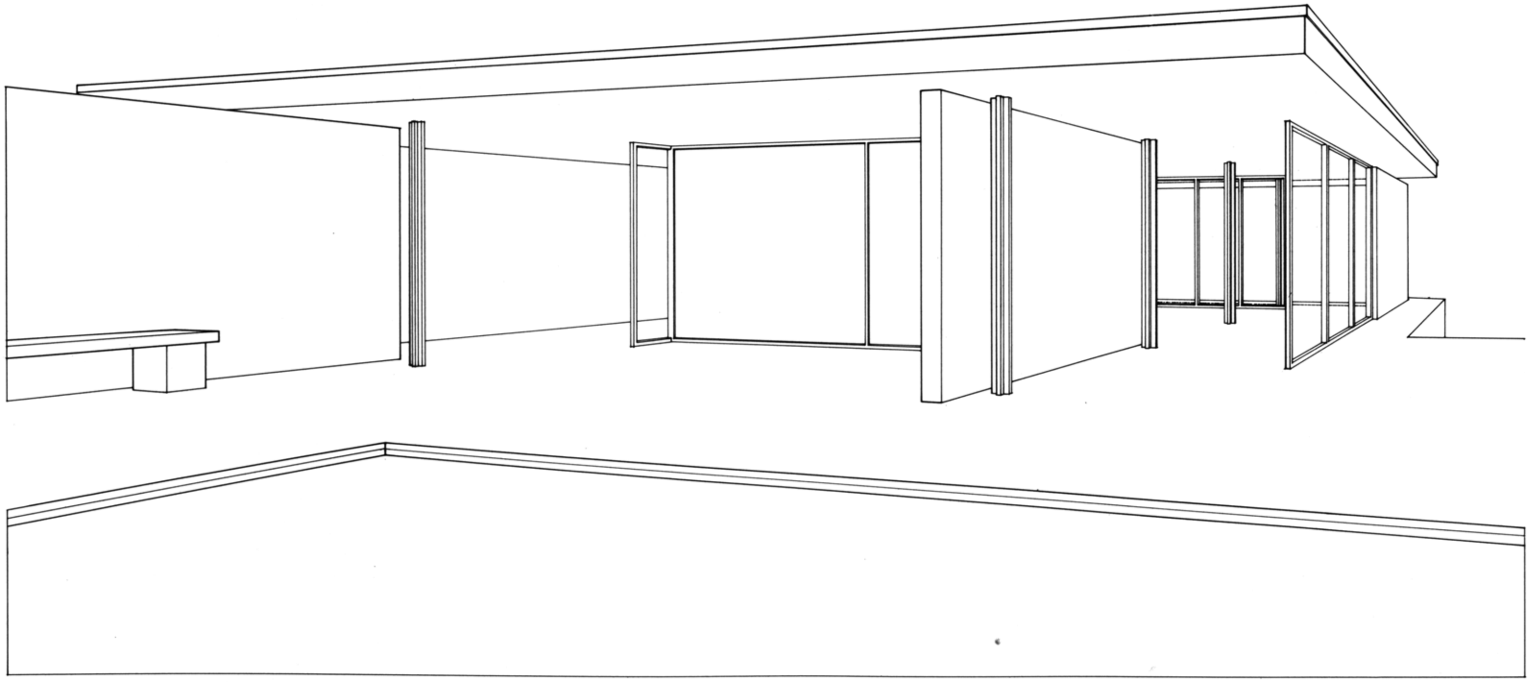
these drawing techniques can be done at different scales, can provide different shadows, textures, and tonalities by the use of color and line, and can range from the broadly general to the extremely detailed, the potential for variation in the architect's approach to design becomes apparent.

Perspectives (figure 3), in simple terms, are drawings of solid objects on a two-dimensional surface done in such a way as to suggest their relative positions and size when viewed from a particular point. In geometric terms, perspective is a conic projection whereby the lines from an object converge to a single point. The image is created by the intersection of the converging projection lines with a transparent picture plane.[49] Perspectives can be drawn from a number of viewpoints, called variously the "station," "eye," or "vanishing" points. Moreover one can draw plans, sections, and elevations in perspective, providing architects with even more alternative views.

What have been called paraline drawings, or axonometrics and plan oblique, combine the plan, section, and elevation in a single drawing and are increasingly important to many architects today as a way to develop and to represent their designs. "Axonometrics, and plan oblique, are drawings that are: True-to-scale plan[s] that [are] projected vertically upward to find the ceiling or roof height or downward to find the floor plan."[50]

The plan oblique (figure 4) is a drawing in which the projection lines meet the picture plane and are shifted to an angle—usually 45 degrees. Plan oblique offers two advantages: it gives a sense of the three-dimensional form of the object that is drawn to scale, and it can normally be generated from orthographic drawings and views.[51] The axonometric family of drawings is one in which the object is tilted at an angle relative to the picture plane. The most commonly used axonometric projection is the isometric (figure 5), which orients the view such that three faces of the object intercept the picture plane at equal angles. Dimetric projection, the other but less often used axonometric view, situates the object such that only two of its three faces intercept the picture plane at equal angles. In both cases, the angle relative to the picture plane produces equal distortion on all the faces of the drawing. This is what makes axonometrics so useful. They offer "a scaled representation of the size and proportion of an object. . . . They can show the three-dimensional form of an object while still drawn to scale."[52] Some architects argue that the axonometric presents the truest three-dimensional view of a building, while others feel that while technically true axonometrics are difficult for laypersons to read and therefore best used by architects for their own design purposes.

Along with these commonly shared drawing types, architects also invent their own individual drawing approaches when they sketch out their ideas for themselves and for others. Some use various forms of doodling, combine the various projections in the same drawing, or use



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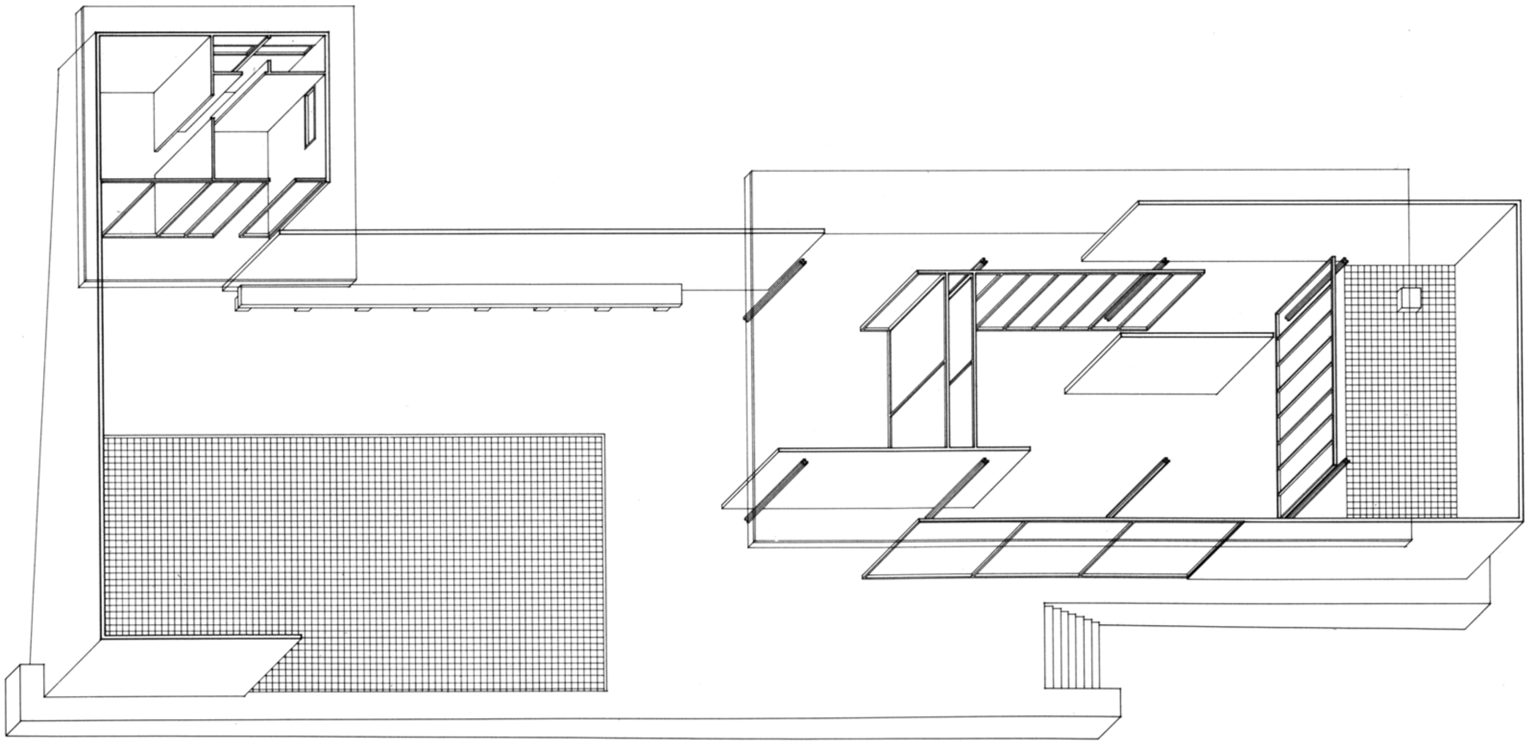

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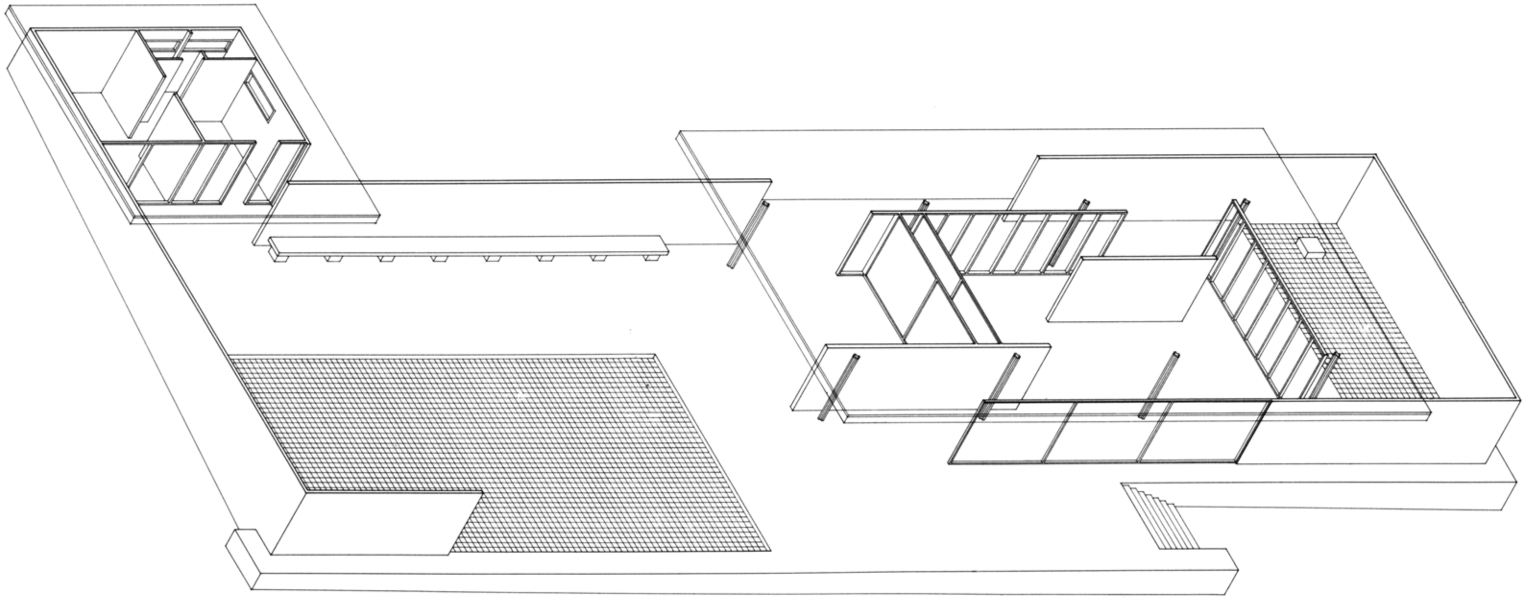

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color codes to represent various architectural issues.

From the most personal to the most conventional, architectural drawing provides a number of vantage points from which to conceptualize, develop, present, and realize architectural ideas. These drawings are variously accessible to other architects and to laypersons. Each drawing type represents a different and often very personal way of dealing with and presenting architectural issues and provides architects with a wide array of tools with which to approach design.

Less personal and more conventionalized representations are called the "working," "contract," "production," or "realization" drawings. These drawings are produced at the end of the design process and are drawn to represent as precisely as possible how the design should be realized in the actual construction of the building. They usually include written text that informs the builder of dimensional and other structural and specific details (e.g., type of material) needed to complete the building. These drawings are usually initialed by those concerned with them and are of recourse if there is any legal or other disagreement concerning the finished building.

In the end, with the general exception of the working drawing, how one chooses to draw suggests a whole series of complex viewpoints about what is important to see and to deal with in architecture. For example, axonometrics penetrate volumes, while a plan offers the horizontal organization of the architectural object as if we were above and parallel to the object. Elevations flatten the architectural universe, emphasizing the face and surface of things rather than their three-dimensional context. Perspective allows us to move through a design but suggests a kind of solipsistic relation to architectural space. Some of these different views appear to be less abstract and easier to read, while others seem opaque and problematic.

The drawing architects use to represent their design is not conceptually neutral. Even though the way drawings represent is not our subject here, it is important at least to have a familiarity with the varieties of representational techniques available. How these are used raises questions about how the use of drawing influences and is influenced by the social organization of design and the social discourse that takes place within that organization.

Drawing and Discourse in Contemporary Architecture

Drawing today, particular variations notwithstanding, serves as a primary medium for generating, testing, and recording an individual architect's own creative and conceptual musings about a design. It also serves as the instrument through which these musings are communicated to others directly involved with the project (other architects in the office, clients, engineers, builders, and the public). Because drawing is used to communicate ideas and to instruct others about a design, it is often seen as a language. Architects, when speaking about drawing, assume more often than not, as they do about architecture itself, that drawing may be construed to be a language or a quasi-linguistic order of communication.

If we look at what linguists have to say about whether architecture itself may act like a language, we may find some clues as to how to treat architectural drawing. Some linguists who have written about this subject argue that architecture cannot be construed to be a language in formal terms.[53] It lacks the internal grammatical logic of language; i.e., it is not self-describing. Moreover, it cannot be generated in the user from a simple set of rules, as a language can be. Architecture needs to be learned as part of a conscious and complex program of education.

The philosopher David Kolb also argues that architecture, by which he means architecture realized as built form, is not a language in the strictest sense of the term, because "buildings do not combine their parts to make predicative or relational assertions."[54] He does go on to suggest that architecture acts like language. Its parts combine, recombine, and substitute for each other with different resulting implications and potential meanings. Architecture may also be seen as a text, with its various parts (e.g., lintels, arches, and pediments) acting as equivalents to paragraphs or chapters in a narrative. Each acts as a general object of meaning.

Architectural forms, however, are also lived in and experienced as everyday objects, which both limits and changes whatever textuality a building might have. This suggests that in architecture form and meaning come from a variety of sources other than the directly semiotic. None of these sources is clearly and obviously more important than any other.[55] In this sense, architecture, if not exactly a language, does act as a form of signification and communicative discourse.[56]

Drawing itself, of course, is not the same as built architecture; it only represents it in various ways. Like architecture, drawings do not make predicative or relational assertions but describe or signify a world of objects through a series of personal and conventional representations. Though drawing, like architecture, can appear to act like a language, it cannot be described by any grammar. Drawing's meanings, because of its level of ambiguity and the multiplicity of ways that it can be seen, cannot be readily described by the use of other drawings in the same way that words can be used to describe meaning in verbal languages.[57]

While drawing is in general ambiguous, it must work, at certain points in architectural practice, as a clear and direct communication. In order for this to happen, it is conventionalized and used within a socially organized network of communication that shares the conventions used to read the drawing. This socially produced communication is the sum of the practices and understanding of architects and those others who are a part of the overall process of creating, developing, and realizing architecture. In this way, drawing can be seen as a critical component of what we might call "architectural discourse."

Discourse, in this sense, is the movement to and fro of messages among a number of individuals or groups and the act by which understanding passes from premises to consequences. As Wlad Godzich suggests, "Unlike language . . . discourse constitute[s] forms of actual social interaction and practice."[58] Thus the fact that drawing is understood and used as it is in architectural practice cannot be explained by reference to some natural linguistic properties of drawing. Nor can the use of drawing be attributed to some essential characteristics of architectural signification or representation. Drawing and the worlds it represents are a product of social and cultural agreements among architects and others. These agreements premise and instrumentalize what medium best represents architectural thought, how this medium should be understood, and what medium should be at the center of the movement of architectural ideas among those who are actors in the whole of the architectural process, e.g., clients, designers, engineers, and builders.

To assure that drawing remains the crucial and shared medium of architectural discourse, its use is kept at the center of architectural education. This form of education makes the architect somewhat unique in our society. While drawing has been a crucial mode of discourse within architecture and a central part of architectural education for centuries, the same cannot be said of the role of drawing in society in general. This too is the result of a social decision. Molly Nesbit points out that drawing was seen as a critical language of industry in late nineteenth-century France;[59] as a consequence, drawing was taught as a part of the general curriculum in French schools. Today, with no such social priority in France or elsewhere, drawing has become a specialized medium of discourse understood and capably used by few in the population.

Design, Social Production, and the Contemporary Uses of Drawing

Drawing, today, is at the root of architecture. It is the instrument through which architecture is most often brought into virtual and actual existence. Architecture, as we noted above, has created its cultural subject and, to a great extent, has produced its social object through drawing for the last five hundred years or so.

As a basis for practice, the use of drawing can provide architects with a significant degree of freedom. Architects, at least in principle, are free to allow their imaginations to roam over an almost infinite set of possibilities. They are able to design the totally fantastic as well as the completely buildable. In a world where economy of means can be a severe limitation on action, drawing allows architects to design with materials, basically pencil and paper, that greatly reduce the initial costs of design conception and development.

Using drawing, the possibilities for innovative design increase. Freed from the time-consuming and costly realities of design-while-building, architects have greater room for experiment. The experiments can work through a whole range of ideas and possibilities without incurring particularly high costs for labor or resources. Since design-in-drawing does not have to be built, architects no longer necessarily need a client nor the resources necessary to build in order to join the larger cultural discourse about architectural ideas and possibilities. Even if an architect has no patron to underwrite an actual building, its design, represented in the drawing, can still be placed before a potential public and within an architectural discourse. This makes a greater variety of practices available to architects. They can choose to be craftspersons; to be designers whose designs are built; or to be designers whose work, through the dissemination of drawings, remains solely in the realm of conception. This range of possibilities is open to many interpretations. On the one hand, it frees the architect from the exigencies of the built world and provides a basis for the expansion of the visual imagination and for architectural experimentation and innovation. On the other, an emphasis on conceptual drawing can result in the devalorization of craft and of the more material and mundane side of architectural practice and thought. It can lead to what W. J. T. Mitchell has called "the tyranny of the graphic image."[60]

More important for our purposes, drawing is not without its implications for architectural design as a social practice. How drawings are used to define practice; what kind of drawings are to be produced and used, and in what situations, and by whom; who is best able to read and understand the various drawings; and what this implies for architectural practice: these are some of the questions that need to be addressed. If we address these questions fully, we will discover that drawings are about more than design ideas and values set free from the realities of social practice. What we find, rather, is that the act of drawing embodies not only architectural meanings but claims about a whole series of external social relations.

Drawing, among other things, may be used to separate architect from builder in the organization of architectural production. It may come to be associated with a system of honorifics that rewards more formal and abstract aspects of design over more material and what we might call "builderly" criteria. This may be viewed either as a liberatory moment for architecture as an art or as a defensive strategy for professional survival. As Kenneth Frampton has argued, drawing can serve both purposes at the same time. Whether we feel it is to architecture's benefit or not, "the socioeconomic crisis attending architecture in the seventies was overcome in part by the proposition that quality architecture could be pursued as drawn representations that would be readily appreciated and consumed by the art market."[61]

Drawing, used as it is in contemporary practice, also creates its own set of dependencies and limitations. Contemporary practice assumes the availability of an industrial system that can provide inexpensive and easily obtainable paper, instruments for drawing, and techniques for quick and relatively cheap reproduction like blueprints.[62] It also assumes the availability of a body of visually literate workers capable of reading architectural drawings and translating them into three-dimensional material form. The use of drawing by architects also presumes a relatively pliant client and public willing to accept the architects' mode of symbolic representation as the primary basis for architectural communication. Finally, the presumption of pliant client would appear to give architects cultural power over the symbols of architectural representation. Ironically, it also puts them in a socially and economically dependent situation. Their expertise and artfulness and the instruments they use to realize them come into play only after decisions about what is to be built, where it is to be built, by whom, for what purposes, and at what cost have already for the most part been made.

We might differ about the power the drawing gives or does not give architects and the freedom it offers to their practice, and we might differ also about the advantages and disadvantages this implies for architectural practice and society. Nonetheless, drawing did and still does free architects from the exigencies of everyday on-site production. In doing so it has provided them an instrumental basis for a whole new series of important cultural and social roles. These new roles have been paralleled, in turn, by a whole new set of functions for the drawing as both a cultural representation and social communication. These functions have involved both the actual conceptual process of design and its realization as an objective architectural artifact. Thus the drawing has come to embody the division between architecture as a subjective, conceptual, and cultural process and architecture as an objective, material, and social process, and serves as the link that needs to be made between them as well.

Drawing, when viewed in this way as a complex cultural and social instrument for practice, provides a basis for a narrative about architecture. Some of this narrative is about the cultural production of architecture and some is about the social production of that same architecture. While the cultural and social aspects of human practice are always intertwined, often it is best to separate them analytically if we are to unravel the richness and, at times, the contradictory nature of the narratives that we use to make sense of this practice.

Drawing as Cultural Act

From an individual and cultural perspective, drawing plays a major, if not entirely decisive, role in the creation and development of architectural ideas. For the majority of practicing architects who use drawing as a medium for creative practice, the act of drawing is, more often than not, the basis for the conceptual development of the design idea. Thinking, seeing, and drawing, in various iterations and permutations, provide a matrix from which to derive an initial conception for a design.[63]

If we accept Michael Graves's argument, the drawing is used by architects in their own thinking and design processes as a kind of internal conversation and as a way to record, test, and reflect on a design. Graves suggests that there are three kinds of drawing that architects produce when working in the initial stages of design conceptualization. There is the "referential sketch," a kind of diary or record of discovery; the "preparatory study," which documents in an experimental way the process of inquiry; and the "definitive drawing," which is more final and quantifiable and is used as "an instrument to answer questions rather than to pose them."[64]

Whether all architects would agree with Graves's particular formulation is open to question. For some, the very act of drawing—the action of the hand on paper—is the basis for their ideas. Others would argue that the drawing simply adumbrates an idea already formed in the mind. This difference in practice may go back as far as the Renaissance. Howard Burns argues that Palladio used sketching solely as a means to test and verify concepts that had been wholly and previously formed in his mind. If Michael Hirst is correct, Michelangelo used drawing quite differently. For him, drawing was a form of invention and conceptual creation.[65] The range of agreements and disagreements testifies to the rich world of cultural practices that the drawing both makes possible and limits.

It would be fair to claim that there is a consensus among contemporary architects that drawing is a crucial (if not the crucial) instrument of architectural discourse. For most architects, drawing is the basis for much of their architectural understanding. Many would argue that until you delineate the design conception in a drawing you really cannot claim to understand it. Architects differ, often heatedly, however, about the appropriateness of the implications of various modes of drawing, such as the plan, the perspective, and the axonometric. For some, the plan reveals the most useful information about a design, while others see the plan as often too abstract to be of great value in evaluating a design's worth. A more heated argument involves the use and implications of perspective.[66] Some architects believe that the perspective is the most informative and least mystifying form of drawing, both for the layperson and the designer. Others aver that the perspective, deriving as it does from the classical architectural style of drawing, is too conservative in its viewpoint about architecture. Those who reject the use of the perspective go on to argue that it provides a false sense of clarity to both the layperson and the architect. In their view, perspective is a prettified vision of the world that as often as not provides architect and public with a distorted view of the building to be realized.

Architects also differ about what drawings to use when and about who should do them in the process of design (conception, development, and realization)—although as one moves closer to realization the process becomes more conventional as well as socially and legally constrained. At conception, for example, some architects begin immediately with sketching or other forms of drawings. Others, a minority, will begin with a model. Some start by using hard-edge drawings at the very inception of a project, while others will use vague sketchlike drawings.

The drawing, moreover, is not only a part of the architect's autonomous process of creation. Conceptual and cultural creation in architecture is usually a group endeavor. How the drawing is to be used at these moments of group interaction is also open to debate among architects.

Architects hold a variety of positions about who it is that draws at different points in the design process; for example, whether it is only the design principal or the whole design team who contribute to the earliest conceptual drawings; or at what point design leaders stop drawing and hand over their work to others in the firm for development and realization. Some principals will even draw the working drawings. Most, however, will only draw at conception and through early development.

As conventional as most working drawings are, differences among offices are often quite apparent. Some architects work out the minutest architectural details. Others will leave their drawings less overtly detailed and allow the builder to work out the particular details of construction and draw them for the architect's approval. The style and conventions of the working drawing vary from country to country as well as from office to office.

Architects also use drawings in quite different ways when dealing with the public or a client. While there are those who will show almost all their drawings to the client, others feel showing too many drawings provides information that is too complex and often too apparently contradictory for the client to understand. The latter architects would hold that a selection of drawings that represent a reasonably full accounting of their work and the choices available to the client is a better way to involve the client. The disagreement here is often not about the degree to which the client should be involved in design decisions but about the best way to involve the client. Some architects believe that drawings will mystify clients in much the same way as medical language mystifies most patients. Others believe that clients are better able to deal with a project if provided the maximum amount of information available.

Even as cultural producers, architects work both autonomously and with others in the creation of a design. In working with others, they can use the drawing as an important means to communicate their ideas—necessarily assuming that they share an architectural culture. Those who have a similar knowledge of architectural drawing are able to participate in an open and shared discourse with the designer. For others who do not share in the architect's cultural discourse, drawing can be used to elucidate the architect's ideas and modes of thinking and the issues that the drawings suggest. At the same time, the architect can use drawing to learn about others' views and understandings of the design. In M. M. Bakhtin's terms, when used in this way the drawing provides a basis for a truly "dialogic" discourse. The "heteroglossic" languages of the many different actors associated with the architectural act are unified, for a particular moment, in a greater communicative and cultural whole.[67]

Drawing, however, can just as easily be used in a monologue and serve to mystify rather than edify others about what the architect is doing. It is, at times, used to eschew participation in favor of the architect's own and singularly important voice in the conception and development of a design. As a form of personal and autonomous cultural production, drawing not only provides architects with an instrument of design but also serves to define a cultural calling. Used as it is at the conceptual stage of architectural design, drawing tells the architect what the design will be. It also informs others of what it is that the architect does and, therefore, what and who the architect is: drawing provides the most material evidence that the architect has unique conceptual and visual talents and a specific medium with which to communicate and use those talents. While the building may be used as material evidence for the architect's talents, it is only the conceptual drawing that can be claimed as wholly the work of the architect. The building itself, it may be argued, is produced by many individuals many of whom are not even architects.

When confronted with an architectural drawing, we are being told as much about the self-definition of the architect as a cultural actor as we are being informed about the specifics of a design. Additionally, by using the drawing in different ways with different stylistic and graphic conventions and emphases, architects locate themselves within various ideological camps and modalities. The drawing tells others, particularly other architects, whether an architect is, among other things, more or less craft oriented; interested in involving others in the design process; and more interested in the image or in the built object.[68] How an architect draws and what the architect shows others of this drawing reveal a great deal about how that architect wants to be seen and where that architect wants to be placed among the varied and often conflicting positions in current architectural discourse.

From the first conceptual drawing, the push and pull between the drawing as monologic and dialogic function within architectural culture asserts itself. On the one hand, the earliest sketches with their fits and starts, the changes that they confront and record, and the questions that they raise represent both an interior dialogue that has taken place within the architect and, as often, an exterior dialogue with others, from colleagues to clients, concerned with the design. When drawing is used to generate discourse in this way, it acts like a kind of anonymous text. The drawing at this moment works, to paraphrase Nelson Goodman, as a kind of allographic symbol.[69] At the same time, drawings at this stage of design can also act to define the authorship of a design. They are, in Goodman's terms again, "autographic symbols." The earliest sketches, because they provide the crucial conceptual image that makes the final design possible, provide a form of intellectual claim, if not legal copyright, for the architect, defining, as they do, the ownership of the architectural idea. The drawing also provides a record and illustration of the creative potential and production of the architect who drew it. As a result, from the first and apparently purely conceptual sketches, drawing conflates the cultural act of creation with the social act of production.

Drawing as Social Act

As we move from conception to realization in architecture, and from what is predominantly an act of cultural production to what is mostly an act of social production, the role of drawing shifts. As an instrument of social production, drawing plays many roles. Some, given the way buildings are produced today, are purely technical. Others serve to create and preserve the architect's social position and particular role within the broader social organization of the production of architecture. Overall, the act of drawing, as well as the drawing itself, embody both the cultural practices of the architect and the social constitution of that practice.

It is through drawing that a design conception is tested and the dimensions, the details, the structural forms, and all the elements that will go into the building are finalized. While often called a "development drawing," this drawing leads to the final specification of the design; it is the development drawings that are used to formulate the working drawing. Development drawings, moreover, delineate not only the building to be realized but the occupational and functional divide between the architect and those responsible for the materialization of the building. They do so by reinforcing the conceptual role of the architect, emphasizing, as they do, making as a virtual rather than a material practice and architecture, fundamentally, as a mental rather than a hands-on activity.

During design development, the drawing serves as a form of test. It is one critical way that architects and their staffs work through their initial ideas in order to assure that these will work if made into a building. As a result, it is usually, but not always, at this stage that other actors significant in the final realization of the design, such as structural and mechanical engineers, lighting experts, and project coordinators, become actively involved with the development of the design.[70] They too add their own ideas and often their drawings as additions to the design process. Their suggestions are most often guided by the conceptual ideas already delineated in the drawings of the architect. The drawings of the engineer and builder, among others, are offered in the spirit of furthering the architect's conceptual design toward its materialization as a built form. All the ideas that are raised at this point and accepted for the design are then reincorporated into the architect's drawings.

After the design is developed, the drawing is the instrument through which architects are able to transform the concept into a realized object. The working drawing—the drawing that historically freed architects from the limits of working only on-site—enables them to guide the production of each element of the design, through the precise specification of each detail, without being constantly present to oversee the work.

In a sense, the working drawing provides a disembodied but authoritative architectural presence. The working drawing contains a number of social presumptions about how and in what way different actors (e.g., contractors, engineers, architect) should work together when producing an architect-designed building. It also presumes that it is the architect who will choose and provide the instrument that will guide production and decide what kind and in what way information about a design will be shared. Thus, within what appears to be a simple and straightforward, even rather conventional instrument of production (the working drawing), a whole range of social distinctions, roles, and definitions of status relating to the conception and making of architecture are adumbrated.

The working drawing is for the most part linear in the way it shares responsibility and organizes production. Directions and information, for the most part, go in one direction. They pass from architects to building contractors and from contractors to construction workers. Contractors and workers may suggest changes. Incorporation of those suggestions into the building is ultimately up to the architect and must be recorded in the drawing. While all the actors involved in the process of production are assumed to read the drawing, it is the architect who is presumed best to actually produce it.

Because the working drawing directs the production of the design, it has come to serve as a legal document as well. Often called "contract drawings," working drawings are the only set of drawings that architects are legally bound to present as evidence if there is any question about liability after the building is completed. Thus the legal record is kept by an instrument that is effectively the architects' own production, even though the architect may not be the sole nor most knowledgeable individual involved in the process of constructing a building. As one architect pointed out to me in a conversation about the uses of drawing, the architect has a distinct advantage in lawsuits where the drawing is introduced as evidence.[71] Judges and juries are wont to accept what the architect says about the drawing and its implications. They appear to feel that the drawing is best understood by its maker, given their own visual illiteracy. If there is a dispute, it is common for both plaintiff and defendant to bring in architects to give expert testimony about the drawing.

In a society where the profession of the architect, while given great cultural status, is often popularly conflated with that of the building engineer, the drawing in this instance is one of the few instruments through which the particular expertise and talents of the architect are legally and formally recognized. Even though others (e.g., engineers) may draw, it is the architect who makes the drawing that embodies the concept of the material object under review. So it is to the architect's mode of discourse and the special talents that the architect has in framing and understanding this discourse that the court will go for advice. This in turn reinforces what is special about the architect: the ability to conceptualize and realize architecture in a form of signification, the drawing, that is the architect's to produce and to understand.

More than a legal record, drawing has also served, at least since the Renaissance, as the critical form of architectural memory. It is through drawing that architects appropriate the objects found in the real world and make these objects their own. When architects see buildings, they draw them to record for themselves what they find important about them. The notebooks of well-known architects often become important texts for later generations of architects.[72] Equally important, drawing serves as the memory of architectural conversations between client and architect, engineer and architect, or builder and architect. Often the drawing is used to cement and contract agreements between individuals involved in different aspects of the making of a building and serves as a memory of those agreements. In the process of production, the drawing as an official memory of what transpired between those in an architectural conversation is often initialed by all parties to assure that no misunderstanding will surface later in the process of making.

In addition to its use as a form of technical direction and social memory, drawing plays many other very critical social roles in the design and making of architecture. From the very beginning of the design process, the drawing is a critical instrument for creating dyadic relationships. These relationships form the basis for all the social interactions and practices that follow in the creation and realization of architecture.

First and foremost, drawing acts to transform the desires, needs, or ideas of others, especially of the client, into the world of the architect. Drawing at this point begins to define the discourse that will underlie the agenda between the client and the architect. While words will be used as well, the drawing transforms the initially rough and unformed ideas of the client into a formed design. Words alone are rarely, for the architect, a sufficient means to create a design from the client's desires or needs. Nor are words adequate to represent the architect's ideas to the client. It is through the drawing that communication between client and architect becomes a specifically architectural discourse.

Within the architect's world, drawing acts to join the autonomous and internal dyad of the initial conceptual act, where the architect speaks with and to the internal "other" materialized in the drawing, to the actual dyads, triads, and other multiples of social interaction involved in the development and realization of a design. At the earliest moments of a design, one architect, usually a senior member of an office, will set out the conceptual basis for what will follow. After this point, architectural design usually becomes a group endeavor, with a number of different architects involved in various ways. Drawing, at this point, provides an instrument through which architects converse visually, aesthetically, and formally about their ideas. Here drawings define what might be seen as complete and incomplete conversations, interruptions, and interrogations. When using drawing in this way, architects are dealing with each other as intellectual equals—if not necessarily as equals within the architectural hierarchy. They are all presumed to share a knowledge of drawing. The drawing, at this moment, both encourages and reflects a give and take of ideas and a sharing of intellectual energy. At the same time, it keeps a record of that give and take in a way that words alone cannot.

Given this shared knowledge, the drawing also provides the basis for architectural directives from one architect to another. Usually, the instructive drawing is done in a sketchlike shorthand while the development of the instruction is carried out in more precise, conventional, and hard-edged drawings. Often, when the architect in charge of a design wants others to make a change, the change is noted on a drawing. If the architect in charge wants to correct what he or she sees as an error, this is more often than not recorded through drawing. And when the architect in charge merely wants another to work on a particular element or detail within a design process, the drawing is the primary instrument for that work.

Employed as it most often is within architecture offices, the drawing thus has two functions. Besides conveying substantive information, it affirms a social hierarchy and the position that each person participating in the conversation holds within the social organization of the office. The same drawing is at once both idea and social action.

When one sees a drawing at any stage of design, it is important to know who drew what, when, and for what reason. In most offices, if one knows who drew the more conceptual sketches, who drew only development drawings, or who drew special drawings for particular parts of a design (e.g., the structure or mechanicals), one can predict with reasonable certainty what that individual's role and status in the office is. Looking at the distribution of drawing responsibilities, an observer can also tell a great deal about how hierarchically an architecture office is organized. Is the office, for example, one in which architectural tasks are for the most part shared by all its members, or is it more taylorized and hierarchical in relation to the various tasks that any design involves? It is also useful to know how many of those who use the drawing actually held a pencil and for how long in the course of the design. It is not uncommon in offices to see a senior designer take the pencil from another individual involved in the process of design to correct or redirect the work done by that individual. The actual interactions that one sees recorded in a drawing bear witness not only to the birth of a design but also to the social organization that underlay that process.

All forms of communication define their own forms of fluency, and their own choices about what is important to communicate. The use of any form of communication is a claim about who is the master of that communication, what it is that needs to be communicated, and how this is best accomplished. The use of drawing as the dominant means of architectural communication is a use claim about what is crucial in architectural design and what best describes design. It is also a claim about who is best suited to claim conceptual fluency about architecture. Thus, embodied in architectural drawing as the linchpin between design and production is its use in producing the substance of design thought and its use in weighing the actors and acts involved in the social production of architecture.

This becomes clearer when one looks further at the various roles of drawing in the management of architectural agreements. In the first place, as we saw, drawing is used to guide and manage the relations of production at all levels of architectural making. It is through the drawing that architects appropriate and translate the work of others into their own work,[73] and it is through the drawing that they assure that the actual building will be an accurate translation of their design. In the second place, the drawing, as the primary means through which architects communicate their ideas to the client, to the public, and to the various others involved in any design, acts as an instrument of management in what we might call "the production of consent." The use of drawing to produce consent parallels the use of drawing to manage the technical realization of the building. What we might call "consensual drawings" provide, in the same way that technical drawings do, the instrument of discourse through which architectural ideas are translated into and recorded as a social agreement.

The production of consent is critical to architects if they are to realize their ideas in the production of a design. Without any real power and without any significant resources—it is the client who underwrites any project and who has the ultimate power over what will be built—architects need some way to assure, first, that their ideas will get looked at and, second, that they will win approval. Drawing provides architects with a form of discourse in which they have the greatest fluency, and one that emphasizes those aspects of design and building (e.g., form, shape, style, measure, and scale) for which they have the greatest expertise. By engaging the client and others with the power of decision within their own discursive world, architects are better able to dominate the creation of a design. Equally important, they have also, in a way, manufactured a form of social discourse that places their medium and themselves at the center of any discussion about potential outcomes. It is notable that the abandonment of drawing by the individual who commissioned the building, which only happened in recent times, and the appropriation of drawing by the architect parallel the change in status from architect's patron to architect's client.[74]

When design ideas are presented to the client and to others involved in the process of design, or when designs are presented for public approval, whether in the mass media, at meetings, or through public authorities, the drawing is the medium that is most often used. Words, texts, and even at times models are also used, but they are usually in the service of the visual image represented through the drawing. By using drawing, architects have the opportunity to decide what is important about the design, and what it is that others should see. Architects, for example, can produce a drawing that gives a sense of more or less completeness, and can choose viewpoints (e.g., a perspective or axonometric) that put the design in the best light or that reveal the strength of the design while hiding weaknesses. Alternatively, they can choose to represent and present problems with the design that need discussion or change. Moreover, by drawing, architects reaffirm that it is the visual that is most important.

The multiplicity of interpretations made possible by verbal texts when speaking about visual forms is reduced and clarified by the drawing. By using drawing, architects limit the possibility of reappropriation of their concepts by providing an image that they best produce and that most clearly delineates what they want people to see. As Francesco di Giorgio realized as early as the fifteenth century,

> There have been worthy authors who have written at length about the art of architecture but they have used characters and letters and not representational drawings, and so, although to the writers themselves it seems they have elucidated their designs according to their intentions, to us it seems that through a lack of drawings there are few who understand them. For following the imagina-

> tive faculties each person makes different compositions which are more different from the truth of the first idea than day is from the darkness of night. . . . If such writers had matched their writings with drawings it would be possible to react to them more directly, seeing at the same time both the signifier and the signified, and so every obscurity would be removed.[75]

Furthermore, the use of drawing to record decisions made by architects, by clients in conversation with architects, by engineers, or by builders emphasizes visual memory. Visual memory and visual skill usually are uniquely the architects' in this relationship. Certainly other means, words and texts, are used at times when creating a record of previous consent. The drawing, so useful to architects in the substantive process of design, also provides them a significant advantage when used as an instrument of social persuasion and as the basis for the representation of social memory.

The architectural profession's general cultural role in setting stylistic and formal controls over design is based to a great extent on the skill with which architects set out particular agendas and directions. Their use of drawing provides them with a unique instrument for setting out this agenda and for turning what appears to be a subservient position into a dominant one. This transformation occurs as architects begin to translate their clients' wishes stated in words into a design presented graphically. Drawing recovers for architects what it appears they lost when agreeing to work for a client. At the same time, drawing serves to reassure the client of the architect's special artistry and skill and provides a practical demonstration of why the client has ceded authority for a design to the architect.

If we envision the architectural process from beginning to end, one image that comes to mind is that of an inverted pyramid. At the bottom, and the basis for all else that will be built upon it, are the architect's conceptual drawings. After the conception is in place, a number of steps need to be taken for the design to be developed and realized. At each step, new actors are added to the pyramid who build their own contributions on the foundation provided by the original work of the architect. Each communicates to others through a series of media, with drawing the critical form of such communication. As more actors are added to the process, more drawings and of a greater variety are also added to the pyramid. Again the drawings that are added are balanced on the initial conceptual drawings of the architect.

Not only the dominant instrument of social and technical discourse within architectural production, drawing is also the primary rhetorical medium of that discourse.[76] If rhetoric is the art of persuasive discourse, then the drawing is the form architects use to frame their rhetorical strategies. Drawing delineates a critical mode of architectural disputation and defines a crucial hierarchy of competence within it.

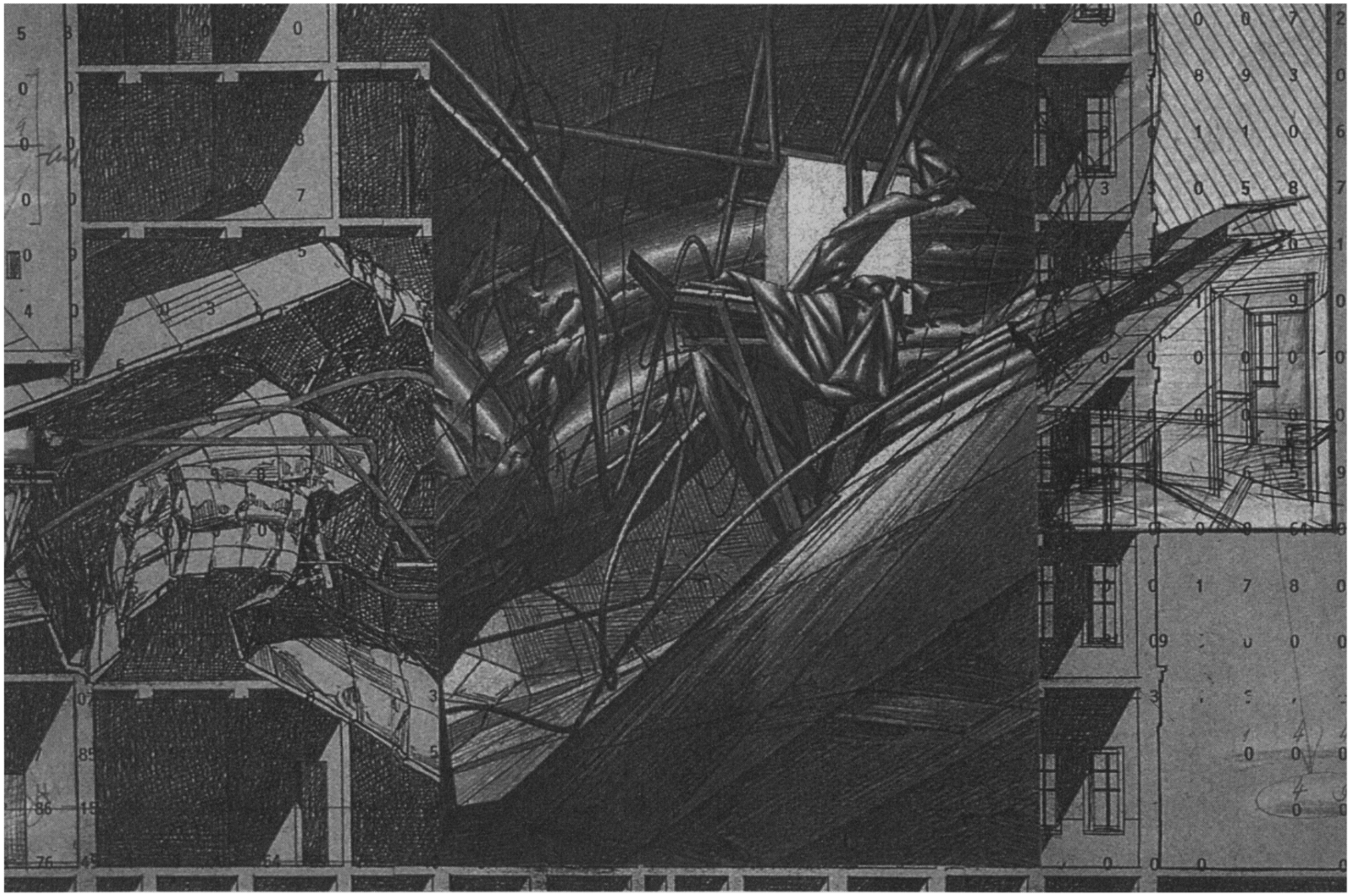
The role of drawing as a form of rhetoric has provided a whole new set of possible social roles for architects as critics, as visionaries, and as artistic fantasists. Drawing makes it possible for them to remove themselves from their role as designers of buildings. Increasingly, and especially with the development of reasonably inexpensive reproduction techniques, architects can become less makers and more artists, using their concepts about built form as the basis for a whole new way of thinking about and commenting on architectural as well as cultural and social issues that face society in general. The work of an architect like Lebbeus Woods, illustrated in his "Composite Freespace Section: Berlin Free-Zone Project" (1990), a 13 by 20 inch drawing done in pencil, photocopy, colored pencil, and pastel (figure 6), suggests the power such drawing can have on our vision of the world, even though it clearly is meant only as a rhetorical and not an actual architectural production. As Woods argues in a note that accompanied the drawing sent for this book:

> Architecture is an important form of embodying knowledge, both that which is commonly held and personally derived. In drawing, the experimental architect commands the full power of architecture as an instrument for extending and deepening knowledge and for communicating knowledge in a universal language of space and time.

In this new form of architectural practice based on drawing as rhetorical instrument, the drawing becomes an end in itself and is rewarded as such, to the extent that it is rewarded at all. It is drawn to be included in books on architecture as a form of textual commentary, or to be seen in museums. Even conceptual drawings associated with realized buildings are often done after the building is completed to emphasize rhetorical or visual effects rather than to illustrate the actual process of design. The new uses of architectural drawing make it possible for the architect to become a major social critic and commentator without a client, without significant social resources, and without, in some instances, ever having realized a building.[77] For some, like Leon Krier, that has been at times a badge of honor. Krier's considerable fame is based on his drawings published before he began to design for real building. As he stated then, "I do not build because I am an architect: I am an architect therefore I do not build."[78]

Privilege, Control, and Essentialization: Drawing and the Social Place of the Architect

It is my position that in becoming a central and crucial instrument of architectural practice, drawing has become a privileged and essentialized instrument of cultural and social practice within architecture. Drawing has also provided the architect with the means to reappropriate control over the process of the design and realization of architecture from those who in the final analysis hold determinative power over what is built in our society: all those who finance the



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built environment, whether developers, public institutions, or any other clients. Privilege, essentialization, and control have profound implications for architectural practice today.

If drawing is given the greatest weight in architectural discourse and production, abstraction replaces materiality as the basis for the process of design. In such a situation, design is produced by the action of mind and hand through an instrument that acts as an interlocutor between conceiving and making. Making, if we allow ourselves a wordplay, is made secondary to the act of conceiving. If the shift from an involvement with the materials of construction to an architecture of abstraction is accompanied by a moral claim for the superiority of the latter over the former, as historically it was, then the social organization of architectural production is radically transformed.

There were social hierarchies within the division of labor in architecture as early as the Middle Ages. These hierarchies, though, were based on one's place and position as a craft worker.[79] With the introduction of drawing as a crucial instrument of design, the differences between the various actors involved with making became qualitative. Some people worked directly on the material production of architecture while others, the architects, worked on its mental production. This effectively separated the socially constructed role of the architect from the materiality of building. In so doing, it made architecture more a cultural than a social act.

The privileging of drawing in the design of architecture created a conflict between the moral claims of architects (and the dominance this gives them in the social division of labor within architecture) and the socioeconomic realities of building. The privileging of drawing emphasizes cultural creation, and the aesthetic and poetic role of architecture as representation and signification, as against the economic, social, and practical needs that most buildings must meet. Cultural act is separated from building as social utility. As a result, the convergence between architectural practice and the production of building becomes complex and problematic rather than simple and straightforward.

Moreover, given this conflict, the role of drawing itself has become complex and potentially filled with internal contradictions, which are mediated in a number of ways. One way is to distinguish between drawing as the representation of a cultural and creative calling and drawing as an instrument of social practice. This is accomplished through the institution of social agreements among the actors responsible for producing building and the promulgation of social regulations that govern these actors. As noted above, certain forms of drawing are conventionalized and made the basis for directing the production of a building. Drawing is constituted in this instance as an instrument of social practice. Conventionalized working drawings, while crucial to the actual construction of buildings, are usually not considered important elements of the architect's creative and conceptual practice. Nonetheless, all aspects of building, even those not directly designed by the architect, are appropriated by the architect within the working drawing.[80] Through drawing, the world of others is transformed, in a way, into the drawing, and through this transformation is placed within the domain of the architect.

Other forms of architectural drawing are left more abstract, legible to fewer actors and drawn by still fewer. Drawing in this instance remains a cultural act, not directly encumbered by the process of production even if eventually it is to be used in that process. When used in this way, drawing can be as unconventional, as poetic or idiosyncratic, as the individual who draws wants it to be.

While different drawings are used to represent the conceptual and the social work of the architect, in the social processes of design they are often joined at various points. At times, conceptual drawings are used in the social process of persuasion or are used to set agendas or manage the discourse of the architect with others involved in a project. More critically, the conceptual drawings provide the basis for what will become working drawings.

In embodying both processes in the same instrument, drawing provides a basis for defining a logical and hierarchical relationship between the process of conceptual creation and that of material production. If thought must come before the making of an object, then the abstract and more conceptual drawing must come before the drawing that is used in production; the former guides the latter. The conceptual drawing, reliant as it is on mental practice, is also of greater importance and higher status in a society that values intellectual over manual practice. Further, if conceptual drawing is also less common and more dependent on special knowledge and skill, then it follows that the person who commands that skill should also be given greater legitimacy and control in the more general processes that define the making of architecture.

Drawing's transcendent importance lies in the capacity it gives the architect to materialize abstract conceptualizations and to create the ideational basis for architectural forms and objects.[81] It is no wonder that conceptual drawing is given such an apparently unchallengeable centrality in design. As a result, issues of craft, the limits of convention, the notions of livability, and the social realities of everyday life, while important within architectural discourse, have become secondary to issues of form, aesthetics, symbolism, poetics, and structure.[82]

Certainly, drawing does not replace making, nor is the final object produced—the building—anything less than the goal for which most, if not all, architects strive. Nonetheless, drawing does become, if not more important than the building, certainly its own measure of architectural worth. Whole reputations, architectural competitions, and architectural evaluations are based on nothing but drawings.[83] With drawing a primary measure of architectural worth, idealization, conceptualization, and an emphasis on originality and difference come to dominate architectural values. Indeed, many architectural historians and critics argue that the real architectural worth of a building is better viewed from the vantage of the drawing than from that of the building itself. The latter, they argue, often compromises the purity of the architectural concept.[84]

There is of course an irony in the claim that the drawing is the purest instance of the moment of architectural design. Even a conceptual drawing not produced to realize a building draws much of its importance from our implicit understanding that immanent within the drawing lies the basis for the social production and realization of a building. This ironic relation creates a double privilege. Drawing is privileged because of its importance in the management of production, while its important role in the management of production privileges the drawing's critical importance as a pure and transcendent conceptual production.

The extent to which drawing is privileged in architectural practice makes it appear as if drawing has its own telos, a telos rooted in the actions of particular actors (architects) and in the logic of their choices. As a result, drawing limits as much as it opens up possibilities. It precludes things that are not amenable to its instrumentality. It weights the social division of labor in a way that places communicative and social boundaries between those actors whose experience with the making of building is primarily phenomenal (hands-on) and those whose experience is primarily noumenal. Also valued unequally are the contributions of those (engineers, builders) whose skills are primarily mathematical or whose work, while using drawing, does so in a more limited way than the architect's.

Even in those instances where architects value contributions from other people in the process, these contributions are still mediated through the architects and their operational and conceptual instrument of drawing. If those who are not architects are forced to work through their ideas within a form of discourse that is the architect's, then it is the architect's vision that in the final analysis is dominant. The modes of thought and the potential contributions to any architectural project of those who do not use the architect's instrumentalities are diminished. No matter how much architects in their own mind value craft, as a value craft is still secondary. The same can be said about the contributions of the engineers who think mathematically and not visually. Their contributions are limited to the extent that their thought process and sense of what the design might be cannot be translated into the architect's instrumentality.[85] Whether the architectural imagination and the actual architecture suffer as a result is open to debate.

Drawing's overall role as a medium of conception, and the way it can embody this as an abstract mental practice, create the basis for a seemingly natural rather than socially and historically constructed order of discourse. This obscures any discussion of why drawing has the status it does within architecture. As Alfred Sohn-Rethel reminds us:

> The conceptual mode of thought arose in history as the basis of intellectual labor inherently divided from manual labor. Intellectual labor of this kind has one common and all-pervading mark; the norm of timeless universal logic. This is the characteristic which makes it incompatible with history, social or natural.[86]

As such, it prevents any discussion of why it plays the role it does, who it benefits and how, and, most important, in what ways drawing might limit architectural perception, conception, and practice.

There is no need to ask whether and in what way drawing might limit the architectural imagination, because drawing is seen as essential to—as the essence of—the architect's practice. As Michael Graves has argued:

> One could ask if it is possible to imagine a building without drawing it. Although there are, I presume, other methods of describing one's architectural ideas, there is little doubt in my mind of the capacity of the drawn image to depict the imagined life of a building. If we are ultimately discussing the quality of architecture which results from a mode of conceptualization, then certainly the level of richness is increased by the component of inquiry derived from the art of drawing itself. Without the discipline of drawing, it would seem difficult to employ in the architecture the imagined life which has been previously recorded and concurrently understood by virtue of the drawn idea.[87]

Architects, in appropriating drawing and privileging its role in architectural practice, have created an instrument of practice that appears to be a natural and universal medium for architectural design. As Francesco di Giorgio argued as early as the fifteenth century:

> Anyone who reflects on how useful and necessary it [drawing] is for every human activity, whether for the process of invention or for the exposition of ideas, whether for working purposes or for art—and whoever considers how closely related it is to geometry, arithmetic and optics—will easily judge, and with good reason, that drawing is a necessary means in every theoretical and practical aspect of the arts.[88]

By this argument Francesco not only makes drawing essential to architectural thought and practice but, in so doing, also transforms architecture itself into an art.

The essentialization of drawing and its appropriation by architects creates the material basis for architecture's own ideological mystification. As an apparently natural instrument of cultural discourse, the drawing hides its own historical specificity and the social construction of its "essential" nature and place in architectural practice.

Essentialization may be a source of empowerment. It may just as easily become the basis for paralysis. Insistence on an essential role for drawing in architecture, and the ways that such a role influences how architects think and practice, may preclude the architect of the future from maintaining a preeminent position as a cultural creator. Advances being made in computer technologies and software, along with others being made in structural engineering, may make the drawing and the types of thinking it represents and privileges obsolete. The cultural capital that the capacity to represent through drawing brings the architect today may become a liability as society makes new social and technological demands on the architect and on architecture itself.

Whatever the future role of drawing in architecture and whatever its future benefits, essentialization of the drawing today provides architects with a basis for an authority with which to control architectural production from conception through realization. If control denotes the act of directing action, the function of regulating through domination, command, and the power of suasion, or if control denotes restraint, checking, testing to verify, then control best describes the social and cultural uses to which drawing has been and still is put in architecture.

Drawing, as noted earlier, sets out in a material and instrumental form the potentials and the boundaries to the architectural imagination. It also sets out the social uses to which this imagination may be put by setting agendas,[89] managing social communication, and setting out the technical directive for the realization of the architect's conceptions. It is both the instrument of cultural command, through which architects as subjective creators and conceptual makers produce their designs, and the instrument of social power, through which they direct the translation of that conceptual production into material production.

This is not to suggest that architects have total control over the process of making architecture in our society. They do not. It is bankers, developers, clients who decide to build and who set out the context in which architects design. Drawing did not provide fundamental political-economic or material control over the general decisions about making architecture. It did, however, provide the opportunity for architects to reappropriate cultural control over how architecture should be conceived and, once conceived, who should control the social process of its design and realization.[90] If control over the architectural discourse does not necessarily make one the only decision maker in an architectural discussion, it would certainly make one *primus inter pares* at the least. From control over discourse, it is a short step to command within the social division of labor that governs the production of architecture.

Drawing performs a role that, while tacitly accepted by most architects today, is one of which architects themselves may not be, in fact probably are not, consciously aware. This role is more social than practical or conceptual. It is involved with the control of the social division of labor within the production of architecture. Such a function for drawing, while clearly enunciated in earlier periods in which architects were attempting to define their dominant position in this division of labor, has become deeply ingrained within a now-established hierarchy of control in architectural practice. As late as 1911, an article on drawing in the *Encyclopedia Britannica* could allude to the increasing loss of control by foreman and skilled craftsman to what they called the "drawing office" and the increasing centralization of control that drawing tended to establish in the designer's hands.[91] In more recent discussions in books and articles on drawing, no such references appear. As a result, the social role and controlling function of drawing can and for the most part do today remain hidden from everyday understandings and discourse.

Drawing may allow architects to reappropriate control over design. But, we must ask, at what cost? In privileging and essentializing particular aspects of design and in emphasizing the cultural over the social reality of a design, architects may be limiting their capacity to join in the broader discussions of just what architecture should be and just how building should be produced in society. Drawing cannot address issues of cost, of social power, and of the uses that social power is put to in the development of our built environment. Rather, by essentializing drawing, architects have shifted the discourse about the built environment to issues that drawing can and does address best; i.e., formal, aesthetic, and cultural issues. On the one hand, many architects clearly want to be a part of a larger debate about the built environment but feel powerless to have a direct influence on this debate as architects alone. Possibly they are correct to feel this way. On the other hand, the emphasis on what the architect does best, and its essentialization in drawing, may unwittingly marginalize the architect as other, more social forms of resistance and action come to the fore.

I argue this because, in summation, when architects draw they are building a whole structure of relationships that they will control or around which the structure will be built. They are creating not only a conceptual framework for what will follow, but a social location for themselves in the structure of relations that produce architecture, a discourse with which to control that structure of relations, and a material embodiment of both the structure of relations and the nature of the architectural object.

Looking at drawing, in the final analysis, brings within our sight all the wonderfully liberatory, crucially social and particularly historical aspects of architecture as a craft, a profession, and an intellectual calling. It reminds us of architecture's possibilities, and its limits; its capacity for experiment and its potential for exclusivity; its spiritual generosity and its institutional parsimony. Looking at drawing allows us to see, as all good drawing should, the image of itself and of its maker in all their complexity and nakedness. Most of all, looking at drawing allows us to join the making of architecture with the architecture of its making.

But if drawing looks as it does to an anthropologist, how do architects themselves view it? To this we now turn.

II Why Architects Draw

Overview

The architects whose narratives about drawing are presented in part II represent a broad range of approaches to architectural ideology and practice. Included are small offices of as few as eight people as well as offices with large corporate practices of over 200 people. Some of the offices have done little building but have published a whole range of drawings in both journals and books. Others have been responsible for the design and realization of many of the skyscrapers that occupy our contemporary urban landscape. The offices represented vary considerably in their organizational ideology: one sees itself as communal in its organization, others view themselves as conventionally corporate; one office prides itself on its self-consciously elite and academic approach to architecture, another is quite unashamedly devoted to design and development. They represent a broad range of architectural and social commitments. Clients served by the various architects also range considerably from working-class community groups to major corporations, from the builder of a small rural school in Portugal to individuals such as Dominique DeMenil.

As a challenge to my own position on drawing, architects noted for their craft-based and participatory approach to design were chosen, as well as a number of firms noted for the inclusion of engineers as partners in design. A narrative from a structural engineer who had worked with a number of the architects interviewed is also offered as another critical perspective on drawing.

Finally, architects from six countries were included to provide a cross-cultural overview and to involve a wide range of voices. Moreover, the architects participating in the project in various ways represent, I think it is fair to say, a broad range of some of the more important and interesting architectural practices on the contemporary stage. I would like to take this opportunity to thank them all for their generous involvement in the project and for their willingness to participate in a book that, while defining drawing in relation to the notion of control, was a book over which they had no control.

Each narrative is based on an extensive interview edited to capture the voice of the participating architect (represented in boldface type in the book). At the beginning of each interview, three questions were asked. From there on, the architects being interviewed could structure their answers in any way they felt best represented their attitudes to drawing. This process was followed to allow the individuals interviewed the greatest freedom to structure the answers their own way. In some cases, they began to express their views about drawing before questions were asked, and this was also included in the narrative. The multiplicity of ways those interviewed structured their answers is of itself interesting. To see which questions are answered in what order and with what detail provides the reader with another insight into the architects interviewed.

Clearly, the questions asked set out a direction and provided an emphasis that guided the whole discussion. All dialogue must begin somewhere and all beginnings set out a framework for the discussion that follows. However, because those interviewed were allowed to reframe the questions, and answered only those questions they felt to be important in the order they found interesting, the questions did not rigidly structure the responses.

The questions were:

(1) What role does drawing play for you in the conceptualization, development, and realization of design?
(a) How and when do you use drawings?
(b) What types of drawing do you use (e.g., plan, elevation, section, axonometric, perspective, sketch), and when and why in the process of design and realization do you use them?
(2) What role does drawing play in regard to and what drawings do you use with these various groups or individuals:
(a) Clients?
(b) Architectural colleagues in your own firm?
(c) Architectural colleagues outside your firm?
(d) Engineers, builders, etc.?
(e) The public?
(3) Do you use drawings produced by people outside the office (engineers, builders, renderers, perspectivists, etc.)? Whose, when, how, and why?

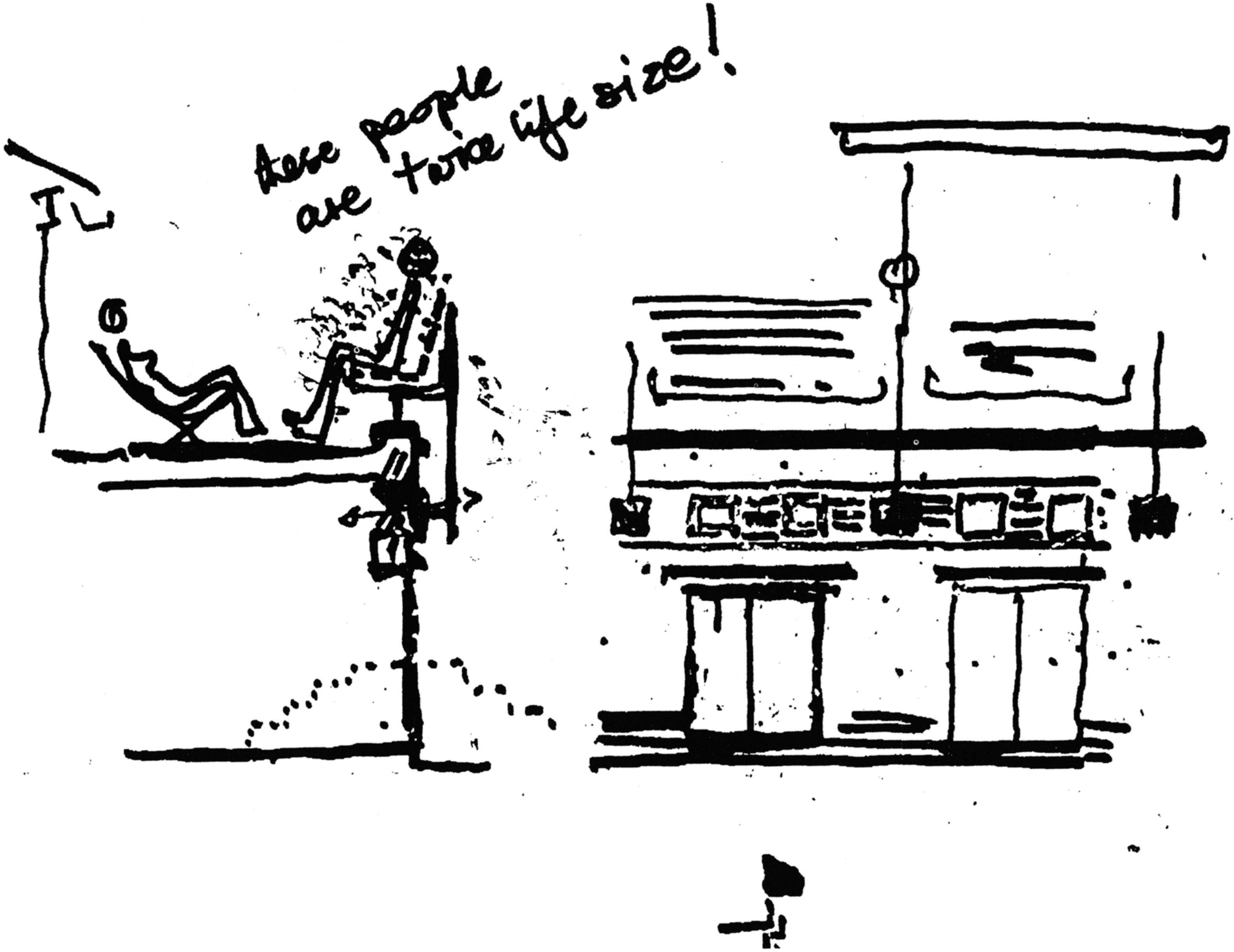
Along with the general questions, a project was selected by each architect and drawings were chosen to represent the various stages of design from conception through realization. The following were then asked:

(1) Why was drawing produced in this project?
(2) When in the process of design?
(3) By whom?
(4) Who used the drawing, how did they use it, and for what reasons did they use it?
(5) When in the design process did they use it?

In some instances, the project architect for the project chosen answered the specific questions about the drawings because it was felt that he or she had a greater familiarity with the overall process or because of the pressure of time on the principal architect.

The projects themselves ranged from drawings for an exhibit in Palermo, Italy, a school in rural Portugal, a health center in London, a major museum, and a community center, through an airport and a series of large and important buildings in London, Frankfurt, and Houston.

If the selection and ordering of poems in a book of poetry reveal the author's poetics, the selection of drawings and their ordering by the various architects participating in this book, in a parallel way, reveal the architects' "architectics." The wealth of drawings for these projects provide the reader (more accurately, the viewer) with a visual panorama on which to ground the various architectural voices. They also provide a rare opportunity to compare, in the same place, a range of drawings from conception through realization of a number of architectural practices; a comparison that in itself should give the reader a better vantage point from which to enter the discourse about drawing and to understand the "architectics" of drawing.


these people
are twice life size!

Edward Cullinan *Edward Cullinan Architects*

Edward Cullinan Architects, an office of about 10 to 20 people, is noted for its concern for community-level practice as well as its design of many projects throughout Britain.

Drawing plays a critical role in architectural design, for Cullinan (interviewed along with Mark Beedle), but not as the means for creating a solution to a design problem: **Some people who are struggling to become architects push pens and pencils up and down the page desperately looking for a solution, hoping that the drawing will produce the solution or the concept. But it never does.** Rather, drawing is a test of what the architect has already conceptualized: **I think that one person or a group of people working together have to have an energetic concept of what it is they are trying to make in their heads or their imaginations, and that drawings are then, as it were, a test of the concept.** Using drawing as a "test" implies, for Cullinan, that drawings exist on a number of different levels. One of those levels is what Cullinan calls the "doodle": **And in our case, the doodle tends never to be plans, sections, or elevations. They're nearly always three-dimensional doodles. They are as much for individuals to clarify things for themselves as to one another. So they are used two ways: as a clarification for oneself and for spreading the notion.**

Drawing is critical to Cullinan during the early stages of design because it operates both as critique and creation. Unlike other offices, Cullinan contends, his office does not allow merely verbal criticism at the early stages of design when discussions about the design conception take place. Rather: **On the whole we discourage the ordinary form of criticism. When someone produces a negative or critical criticism of what someone has done, we encourage what the Americans call "so do it" criticisms, whereby in a discussion that a group is having you have to draw your alternative if you want to replace someone else's drawing with yours. In other words, you just don't knock someone's drawing, you draw an alternative.** To work this way, of course, Cullinan adds, the office has to share a broad ideological point of departure.

Because the office is very interested in the way buildings are made, their architecture very much has to do with the actual crafting of a building. What this means broadly to Cullinan is that the office is most concerned with how the pieces go together and how one keeps the style and the grace of this putting of the pieces together as an inherent part of the building. As a result: **From very early on in our tests of notions we do things that look like working drawings. We do things that are very large, screw-them-together drawings, which is also a test of the idea. So some of these sort of finished ready-to-build-it working drawings go right through to the end of the project and some of them die with the idea. We embark on very thoroughgoing tests so we don't mind how elab-**

orate the drawings are that get thrown away in the process. In testing ideas at the early conceptual stage of design, Cullinan uses a whole array of drawings: small sketches, working-like drawings used to develop ideas, and scale working drawings. What he does not like to use at this early stage of testing ideas is what he calls the "competition" drawing, a more finished and elegant type of drawing. While the office does use competition type drawings when necessary, Cullinan sees them as more seductive for clients and others outside the office than useful in testing and developing ideas. However, when he does produce such drawings they are always based on what the office has already designed rather than on pure speculation: **The sort of elegant, rendered drawing of a scheme we do only when it is called for, either by trying to get it through planning or trying to get it through clients. We do pictures of what we have got. The first chapter is about doodles and then detailed drawings which are to test what we're thinking. Then the second chapter is like doing pictures of what we've already got.**

Cullinan sees the use of the more seductive and elegant drawings made necessary by the realities of the present situation for architecture in Britain: **So those, as it were, pretty drawings are becoming in the present world increasingly necessary. We live in the crowded southeast of a very crowded island and it's populated by an extremely vociferous, large middle class which has a very conservative frame of mind which makes getting planning commissions and getting buildings through [local planning commissions] an extremely difficult process. So one has to admit to such drawing, and actually I admit it with some pleasure because I don't mind a certain deviousness in life and to doing drawings that are designed purely to seduce. But all that happens after we've got something that we want for itself.** When working out what they want for themselves, the Cullinan office rarely uses hard-edge drawings or plans: **On the whole we hardly spend any time at all working out plans. We spend our time trying to work out the three dimensions of a building and what its character is going to be like, when you are there. I think every architect knows that even though Corbusier said the plan is the generator, so is the section, so is the elevation, and so is the quality or the integrity of the atmosphere you are trying to create.**

If drawing a design is an act of testing ideas, it is also—and this is equally critical for Cullinan—a political act, given social realities today: **You know in the present scene one hardly ever draws a scheme and gets it built. There is a great deal of resistance and to some extent philistine objection to our doing anything at all. So then you become a political beast. You propose a very big scheme first and they [planning boards] can hack it down. And then the problem is to sustain the integrity of one's own architecture through this process of what I**

will politely but inaccurately call a "debate."

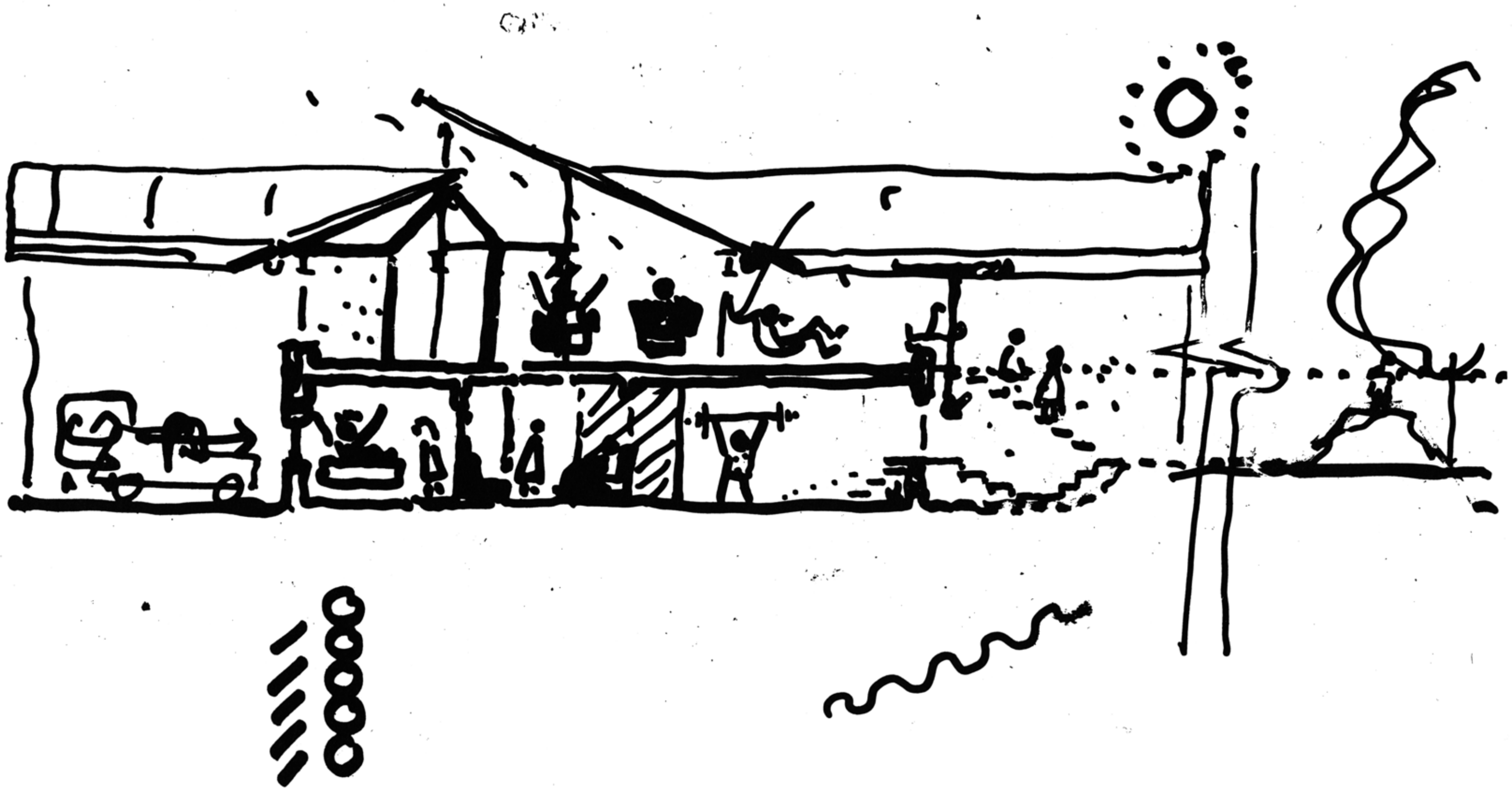
Whatever problems the architects face in trying to realize their designs in society, Cullinan argues, the process of design within the office is equally important. It is critical to involve individuals on the design team who will ultimately be responsible for the working drawings at the beginning of a project because the detailed grace of a building is in its making and in the bits and pieces of which it is made. The process of conceptualization must, therefore, be linked directly to the production of working drawings: **And there is no way to understand buildings at that level unless people who are involved in the initial concept are required to do the working drawings to imagine the way that it's built and the pieces it is made of right from the beginning.** Because he firmly believes in this method of design, Cullinan often does working drawings himself. **I know of no other way for buildings to gain integrity and depth than for the people who do the imagining to test that imagining, by doing the pretty drawings when necessary and then by doing the working drawings.** The only part of the process in which Cullinan usually does not participate is that of site management. This, though, is not out of choice. Given the nature of architectural culture today it is critical that he be involved in the public relations side of the work—at times, others in the firm do that as well—so Cullinan has little time for site management.

To understand the process of design the office uses, it is important to see the kinds of drawing that the office does from the earliest conception. For example, when doing the early doodles that are three-dimensional we need to see that they are not perspectives as such. They are **usually just little overhead projector type doodles that let you see the thing you are setting up in three dimensions to give a sense of the building. We draw insides and outsides [figure 7] beside each other, and it's nearly always from slightly above so you get a sense of the thing as an object.** The working drawings that are produced at the early stage of conception are not significantly different from those produced for actual realization. The latter drawings differ only in that they have writing on them indicating dimensions, materials, and other important guidelines for the builder.

When it comes to the use of more traditional hard-edge drawings, Cullinan uses them, he says, only when they are required by planning commissions. For his own thinking and communication with clients he prefers to use the doodles, which he draws all the time, even when speaking with clients: **Unlike some architects who say they must go away and think before they draw anything, I am quite happy to sketch possible schemes, sketch doodle possibilities in front of clients, sometimes at the first meeting. But we always explain to them that this isn't a scheme, it is just a reaction to what they have been talking about.** Part of the reason that Cullinan uses this strategy of drawing has to do, he points out, with the kinds of clients he usually has. Although he sometimes gets to do large buildings for a single client of more or less national or local importance where planning permissions are not particularly difficult to obtain, Cullinan's office has tended to do projects that are on tricky historical sites, like the project he did at Fountains Abbey or Harrow on the Hill, or they incorporate historic buildings or community buildings. In each case they are buildings that involve a large number of people with different perspectives rather than a single client. Unlike architects who can separate their thinking from the presentation to the client, Cullinan feels he cannot.

As a result, he has developed a strategy for dealing with the contingencies of community-based design: **I've discovered that much the best thing when a large number of people are going to be involved is to go public straight away with your first thoughts and let them express their ideas—draw their fire and let everybody have their say and their howl. Then you develop the scheme or do other schemes as a result of that so-called debate. I have democratic instincts but really in a way it is just convenient for ourselves. But it is very painful at times because you always get hacked to bits in the first round. So you go public, get hacked to bits in round one and only after that do you start piecing together a scheme.** Drawing, in this instance, becomes a way to communicate with the community in the process of developing a design scheme: **The first schemes we do will be notional schemes for the first public meeting and put up in front of them. Otherwise, you go to a public meeting and you are expected to obey what people ask for: which of course, because it is a committee, would end up with you designing an Edsel. For a good result the debate must be two-sided. It must have an energetic contribution from the architect at the same time as allowing people voice.**

It is important, for Cullinan, to draw at all times if he is to produce a good design; for his own thinking, and as a strategy for involving people in a design process and directing the course of any discussion: **We produce schemes and I doodle and draw on overhead projectors at the meetings always. And I am perfectly happy if someone in the audience says "what if we did it like such and such" and then to have to go and doodle that solution on the overhead projector—which occasionally results in a genuine contribution to the scheme but, in my view, just as often shows that the suggestion is not all that useful. This is very important. If one is discussing either community architecture or so-called community architecture, whichever one thinks it is, *the most important thing for me to say is that the final result will only be as good as the commitment of the people who are involved in it and the capacity of the architect to design deliberately and consciously in the situation he finds himself in. That runs completely counter to the ordinary understanding of***



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community architecture which is that the architect is there to draw other people's ideas. No good architecture will come out of the community architecture movement until it is understood that the architect must commit himself to thinking, drawing, imagining, proposing and debating actual buildings that he or she can imagine doing and putting their name to. **[Architect's emphasis.]** As Cullinan has begun to work for more corporate clients he feels his style and approach to drawing should change, but for the most part they haven't. If there is a change, it is toward more easily understood and "slightly posher" perspective drawings. Cullinan, though, prefers not to use this form of presentation. He feels his voice does not go along with the drawing as it does when he doodles and speaks.

The question of voice is also critical to Cullinan because as a teacher and lecturer he is constantly presenting his work and his ideas to architectural students and practitioners as well as the general public. For these presentations Cullinan has developed a particular strategy of drawing and speaking: **I give a large number of lectures, at least one a month, probably more, both here and abroad, in which I describe our buildings and our way of thinking. To do that I use slides and one overhead projector on a screen together. The slides are actual buildings but the overhead projector displays three different levels of drawing. One is a colored drawing that is one-half working drawing and one-half presentation drawing which I then doodle over. The second level is the same: a drawing doodled over and explained by me. And the third is a blank sheet of acetate on which I draw illustrating the bones of the scheme [figure 8], the idea behind the scheme, the way it is built, and the atmosphere the scheme is trying to create at the same time that the slides of the scheme come up. So that is as if one were in the office doodling to test an idea except that it's a built idea one is doodling in front of the originals to elucidate the scheme. It's like a hindsight doodle. There is a foresight and a hindsight doodle at the two ends of a project; at its first conception and when it is described to other people.** The only difference between lecturing to architects and architectural students and presenting his schemes to the public is that Cullinan tends to be more graphic and spends more time with the public. Also, when presenting to laypersons he tries to make his drawings more narrative so that people can feel they are making a journey through the scheme he is trying to explain. This same technique is often used with clients, whether a community group or corporate executives, when making a first presentation. With corporate clients, however, he will usually present more traditional drawing types like plans, sections, and the like.

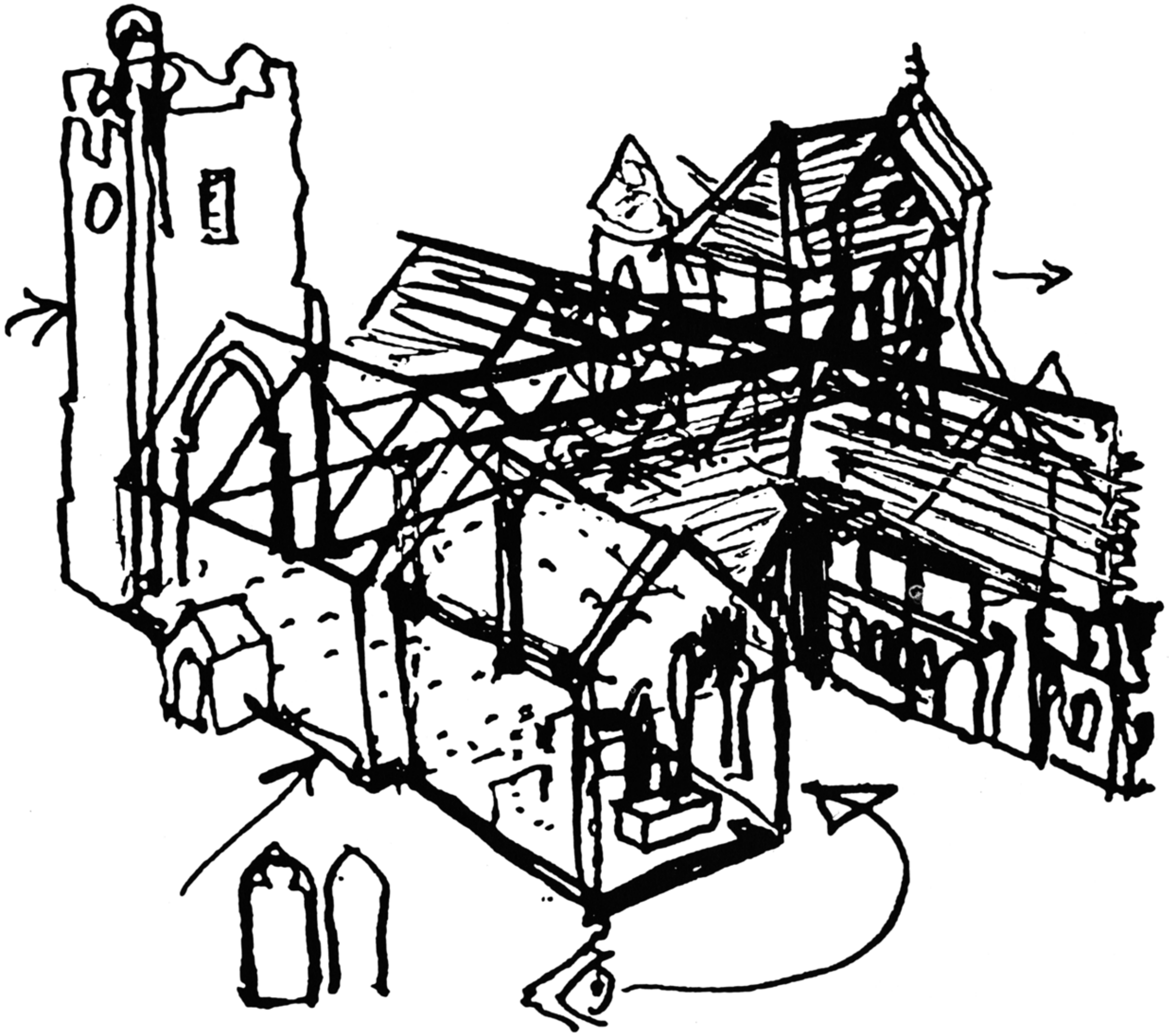
Because Cullinan feels the doodling method is the clearest, most informative, and most efficient when discussing building schemes, he also uses such drawings when dealing with engineers and others in the building process.

During discussions with engineers, the latter will often doodle with the architects to help expedite a scheme: **We explain the building through doodling. For example, our engineer told us how to make the roof for the Barnes' Church one afternoon just by taking a notional plan and doodling over it [figure 9].** While the engineer will doodle over the previous work of the architect, the main idea remains that of the architect. The doodle method Cullinan feels brings the engineer closer to the process of design: **I mean we are designing together but really I have to stress that the ideas are really ours. But we are realizing it together.** When dealing with infill elements like heating, Cullinan tries to get the service engineers to integrate their drawings with those of his office: his drawings being the lead drawings that set out the building.

For the most part, all architectural drawings from conception through to realization are done by members of the firm except in situations where special perspectives are required. This is critical to Cullinan's notion of practice: **That is an aspect of what I have been talking about, about what I'll call an integrated practice where the same people go from the doodle to the final realization drawings for the building. I don't suppose you could do this in a very big practice unless you split into separate groups of about fifteen people. So although we are being offered a great deal of work we don't take it all in order to preserve our capacity to work in an integrated way.** In the final analysis, the relation of drawing to the firm's practice is critical to Cullinan because drawing is the mode by which one produces design, tests it, presents it, and finally realizes one's scheme in the larger arena of which design is a part.

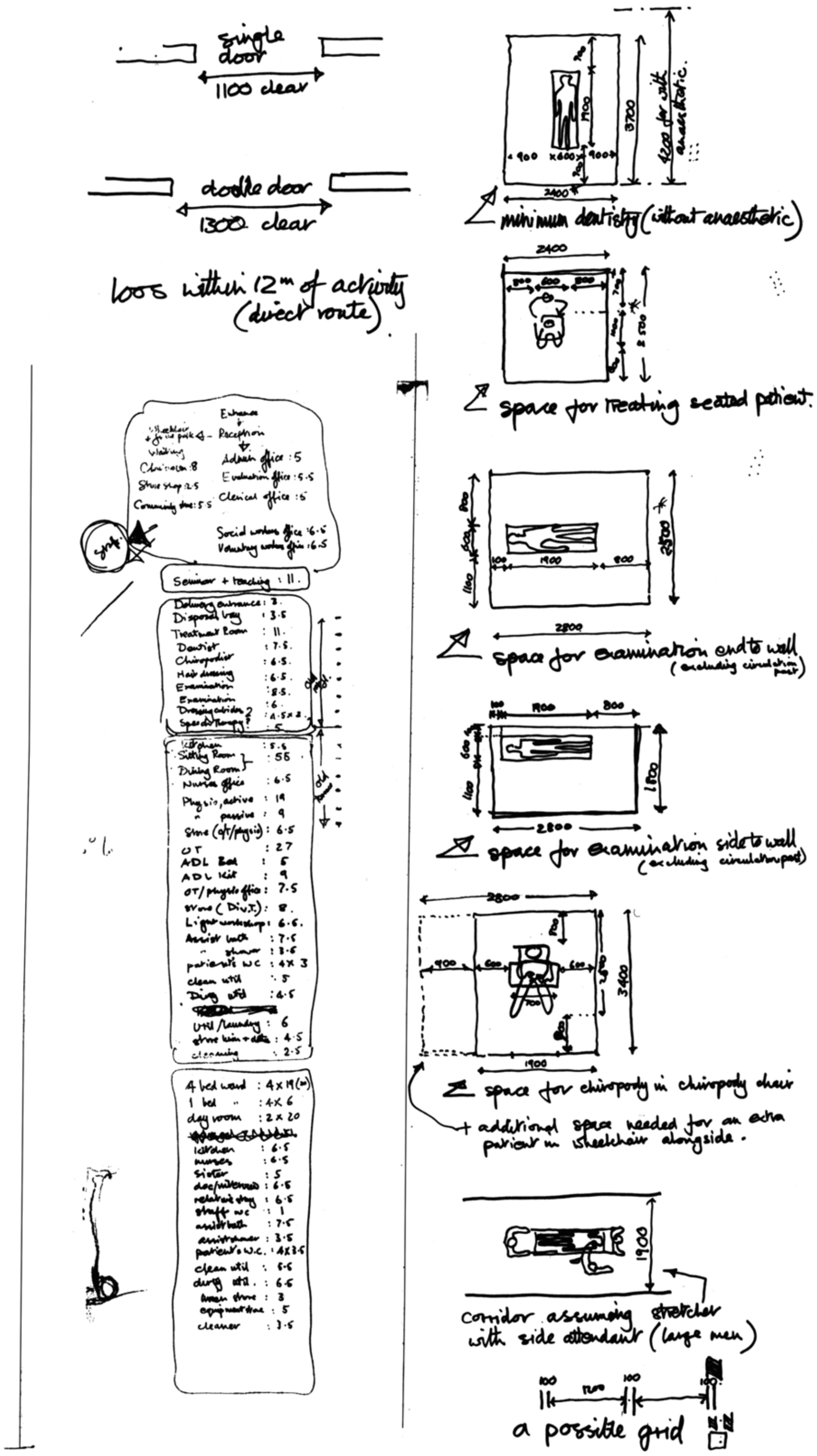
The Lambeth Community Care Center in London is a most successful example of the way the Cullinan office works in the design of a community-based building. The office got the job when the client told Cullinan that he was on a short list of architects for the project. In response, the office presented a series of slides of their work and on this basis were chosen for the project.

With a fairly elaborate program, operational policy and schedule of accommodation had been developed by the client before Cullinan's office began its work on the project. These were used by the office as a starting point. Eventually, the program was tightened up as a result of a series of meetings with the client. At first, the work of those responsible for the project was informal because the office was not on the list of approved hospital architects and had to await official approval. Once appointed, full schemes were produced every two months from the date of appointment in August till April. On this particular project, Cullinan felt it important that the client should be pushed to think using drawings to help them make decisions. The client, according to Robin Nicholson, project architect, was not used to working in this way, but the design team felt



9

10


single door
1100 clear
double door
1300 clear
loos within 12m of activity (direct route)
3700
4200 for with anaesthetic.
1900
900
600
2400
minimum dentistry (without anaesthetic)
2400
space for treating seated patient.
2800
1900
800
1100
space for examination end to wall (excluding circulation past)
1900
800
1800
2800
space for examination side to wall (excluding circulation past)
2800
3400
900
1900
space for chiropody in chiropody chair
+ additional space needed for an extra patient in wheelchair alongside.
1900
corridor assuming stretcher with side attendant (large men)
100
100
a possible grid

Entrance
Reception
wheelchair + pram park
waiting
Admin office : 5
Chairs/area : 8
Evaluation office : 5.5
Store shop : 2.5
Clerical office : 5
Community store : 5.5
Social workers office : 6.5
Voluntary workers office : 6.5

Seminar + teaching : 11.

Delivery entrance : 3.
Disposal bay : 3.5
Treatment Room : 11.
Dentist : 7.5.
Chiropodist : 6.5.
Hair dressing : 6.5.
Examination : 8.5.
Examination : 6.
Dressing cubicles? : 4.5 x 2.
Speech Therapy? : 5

Kitchen : 5.5
Sitting Room : 55
Dining Room
Nurses office : 6.5
Physio, active : 19
" passive : 9
Store (o/t/physio) : 6.5
OT : 27
ADL Bed : 5
ADL Kit : 9
OT/physio office : 7.5
Store (Div.T.) : 8.
Light workshop : 6.5.
Assist bath : 7.5
" shower : 3.5
patients WC : 4 x 3
clean util : 5
Dirty util : 4.5
Util/laundry : 6
store linen + dts : 4.5
cleaning : 2.5

4 bed ward : 4 x 19 (m)
1 bed " : 4 x 6
day room : 2 x 20
~~[illegible]~~
kitchen : 6.5
nurses : 6.5
Sister : 5
doc/interview : 6.5
relatives stay : 6.5
staff wc : 1
assist bath : 7.5
assist shower : 3.5
patients w.c. : 4 x 3.5
clean util : 5.5
dirty util. : 6.5
linen store : 3
equipment store : 5
cleaner : 3.5

that it was necessary to get informed discussions about the design. The schemes were drawn with some detail to help with the overall discussion (figure 10).

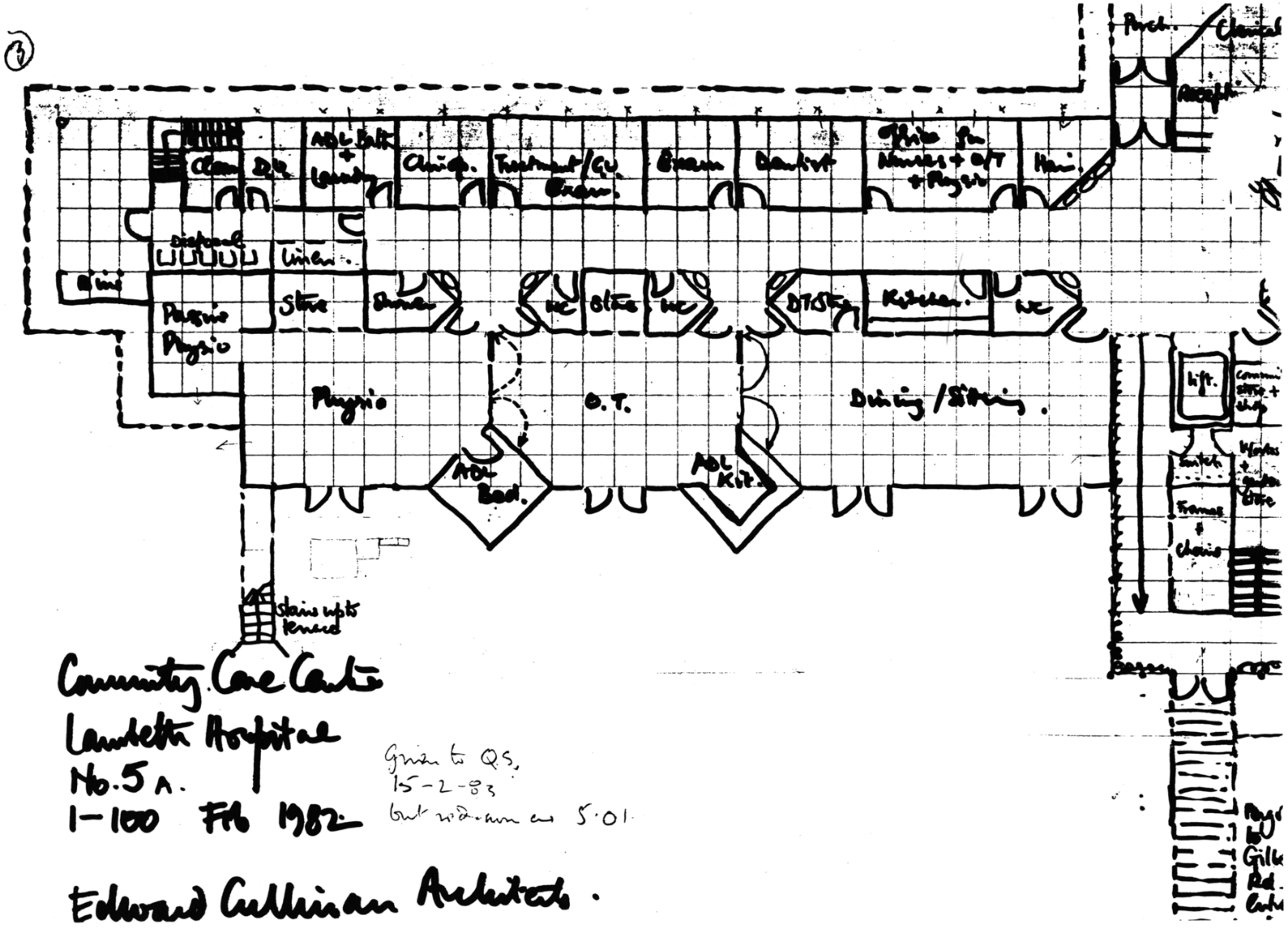
As in most community design processes, there was some creative conflict between the client and the architect and within the client group itself about style and objectives. As a result, it took a long time, according to Nicholson, for the discussion to calm down, stabilize, and become effective.

What is also noteworthy, to Nicholson, is that as one goes through the drawings one notes that they were produced in what Cullinan calls a nonhierarchical style. Members of the project team did drawings at all levels of the project from conception to realization and all the drawings were available to the client. Many were done at meetings or for presentation to the client at meetings (figures 11–13).

Figures 12 and 13, drawn by Ted Cullinan early in the design process to find the grid around which all the spaces the client asked for could be accommodated, were drawn mostly for use by the design team. They were **a way of feeling what the scale of the building would be by drawing it. We do these kinds of drawings, not massive numbers of massing studies.**[1] Figure 14, again drawn by Cullinan, was a contraction of figure 13 applied to a room in what would be a four-bed ward. It is a continuation of the research begun in the drawing in figure 13. While drawn early in the conceptual stage for the use of the design team, it turned out to be the design of the ward that was actually used in the final design.

In order to discover whether the meter grid would make big wards and small wards equally well, Cullinan drew the drawing in figure 15 to resolve an argument between himself and Nicholson. The drawing was produced for use by the office, the client project team, and the quantity surveyor (the latter to see about costs), in order to make sense of a gallery in which the corridors become rooms and widen to make places. Nicholson comments: **We kidded ourselves it would work but the small wards were too small. We had an argument over the practicality of joining four day rooms together. Though we had a rational plan, it was really an arts and crafts plan. The plan was meant by me to be a compromise but it was rejected by the office and Ted.** While this specific scheme was not accepted, the general idea was further and differently developed in later drawings.

Drawn before figure 15, figure 16 was a conceptual drawing produced for and taken to a meeting with the clients. Drawn by Nicholson with both his and Cullinan's written comments on it, it served both as a guide for the client and the design team and as a record of the discussion held between the two. It was an "urban garden" that led to a huge argument about garden design: **This drawing shows a ramp around a lawn, which we called a "croquet lawn,"**

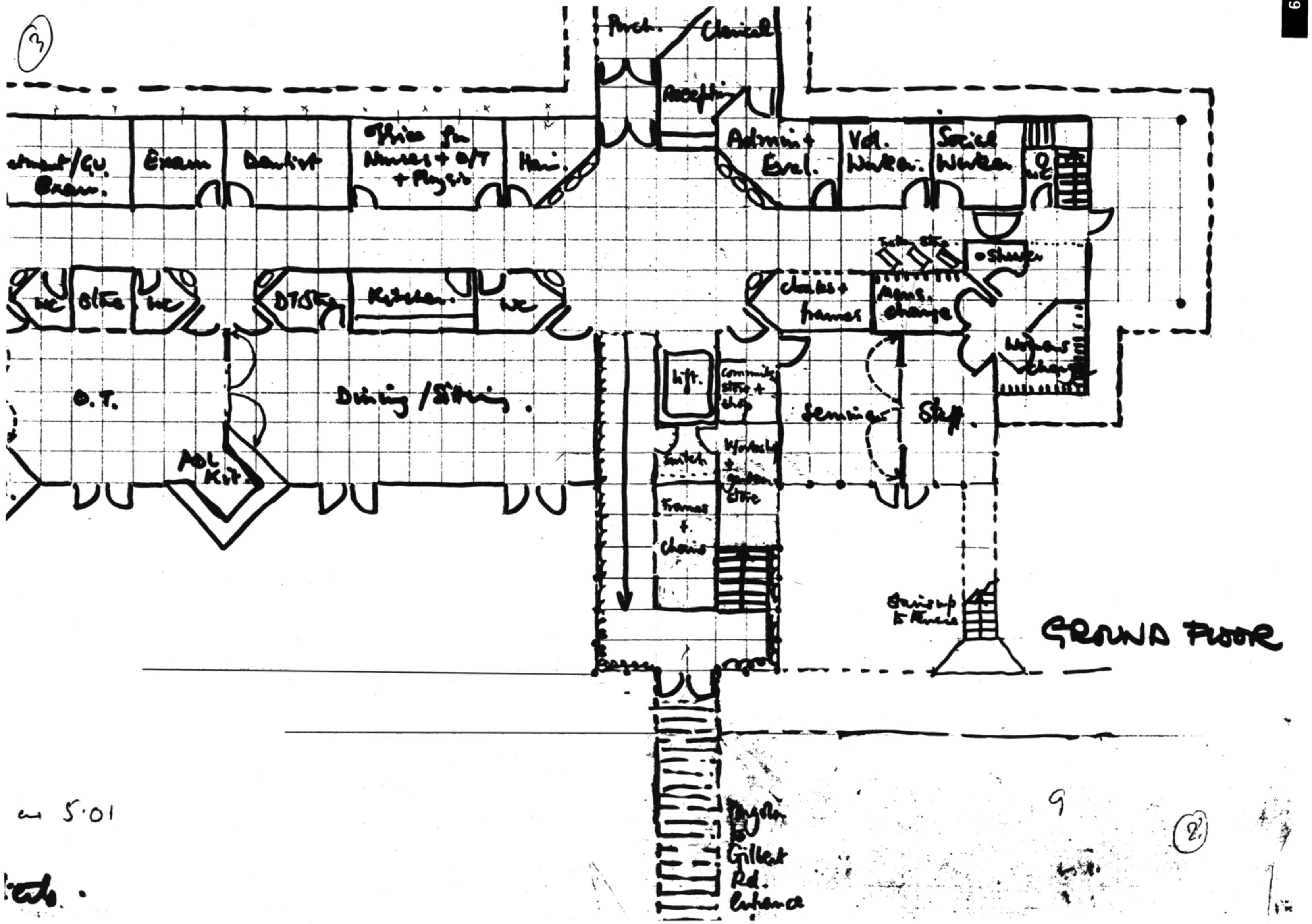


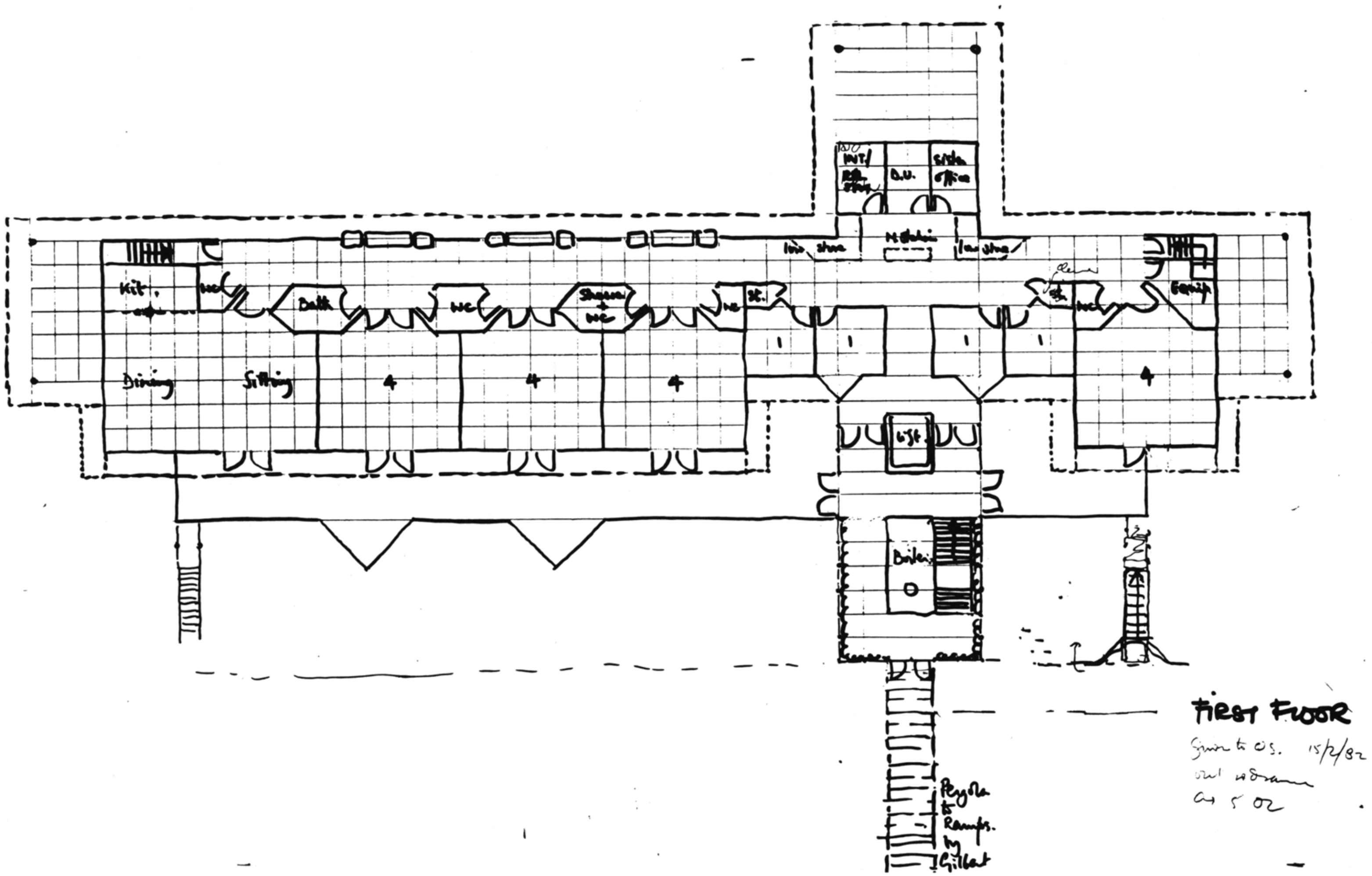
Community Care Centre
Lambeth Hospital
No.5A.
1-100 Feb 1982

Given to Q.S.
15-2-83
but redrawn as 5.01.

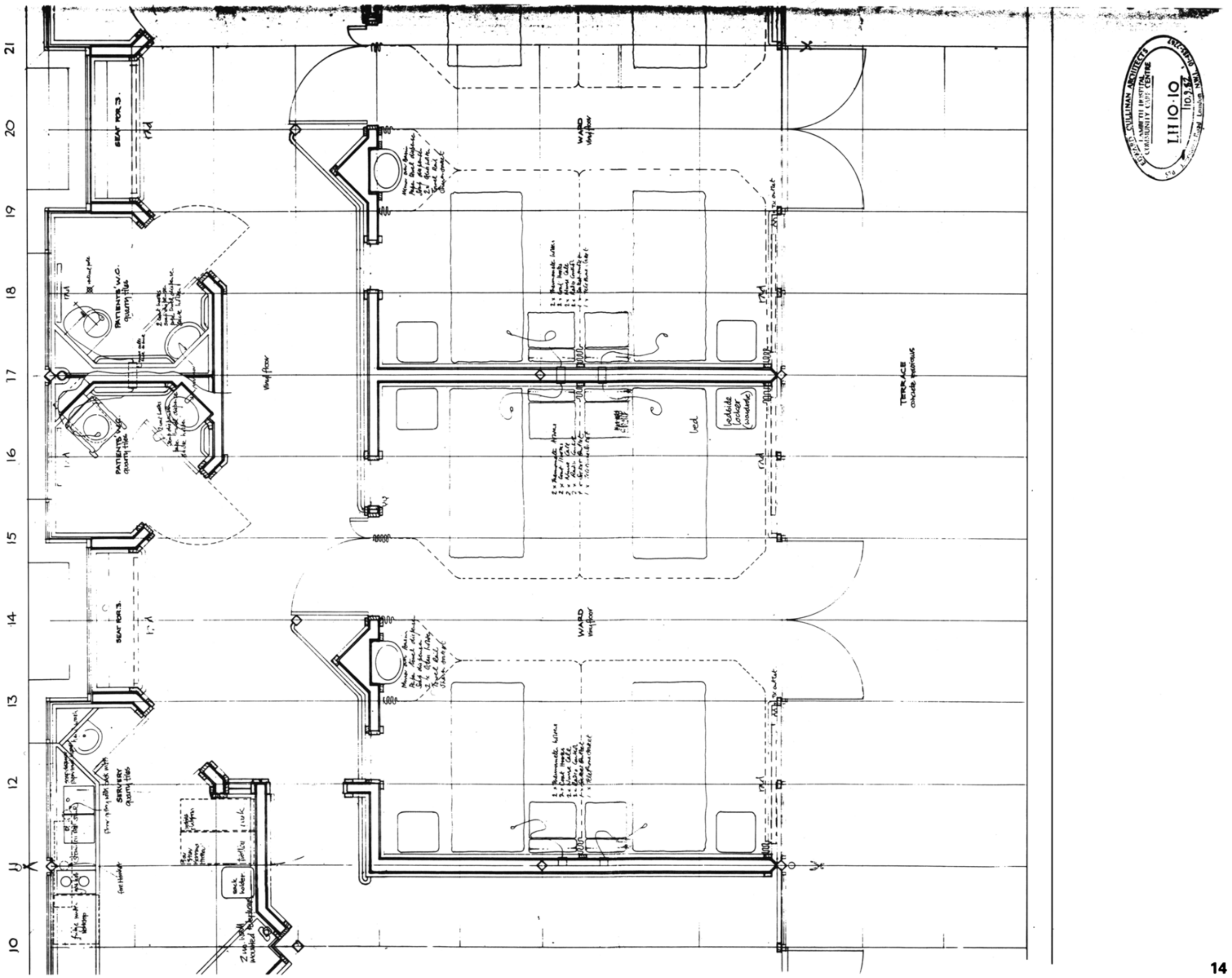
Edward Cullinan Architects.

11


3
ment/G.U. Exam.
Exam
Dentist
Office for Nurses + O/T + Physio
Hair
Porch.
Clinical
Reception
Admin + Eval.
Vol. Worker.
Social Worker
WC
Staff Store
Shower
WC
Store
WC
DT Store
Kitchen
WC
Cloaks + frames
Mens change
Womens change
O.T.
Dining / Sitting.
ADL Kit.
Lift.
Community Store + shop
Switch
Workshop + Garden Store
Frames + Chairs
Seminar
Staff.
Stairs up to Flat
GROUND FLOOR
Ramp from Gillett Rd. entrance
9
2
5·01
ts.


Kit.
WC
Bath
WC
Shower & WC
WC
St.
low stair
N. Station
low stair
St.
WC
Equip.
D.U.
Side office
Dining
Sitting
4
4
4
1
1
1
1
4
Lift
Boiler
Pergola to Ramps. by Gilbert
FIRST FLOOR
Given to O.S. 15/2/82

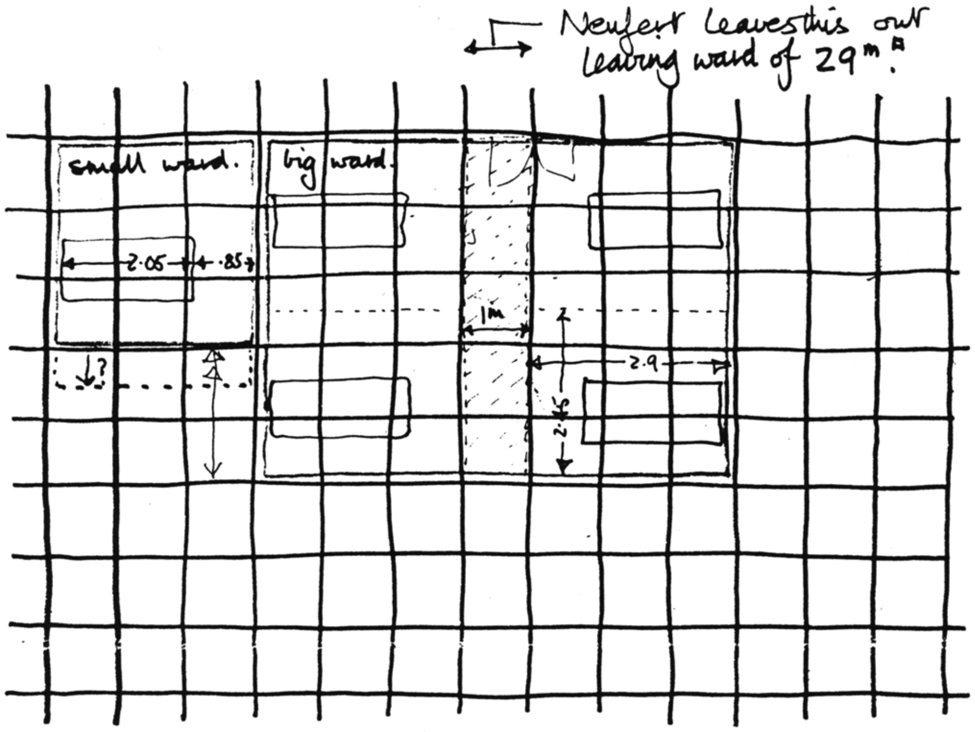
13


21
20
19
18
17
16
15
14
13
12
11
10
SEAT FOR 3.
PATIENTS' W.C.
PATIENTS' W.C.
SERVERY
WARD
WARD
bed
bedside locker (wardrobe)
TERRACE
concrete
EDWARD CULLINAN ARCHITECTS
LAMBETH HOSPITAL COMMUNITY CARE CENTRE
L1110·10
10.9.82

14

15

1^{m} grid. (assuming 50mm off for walls) as at Walton on Thame



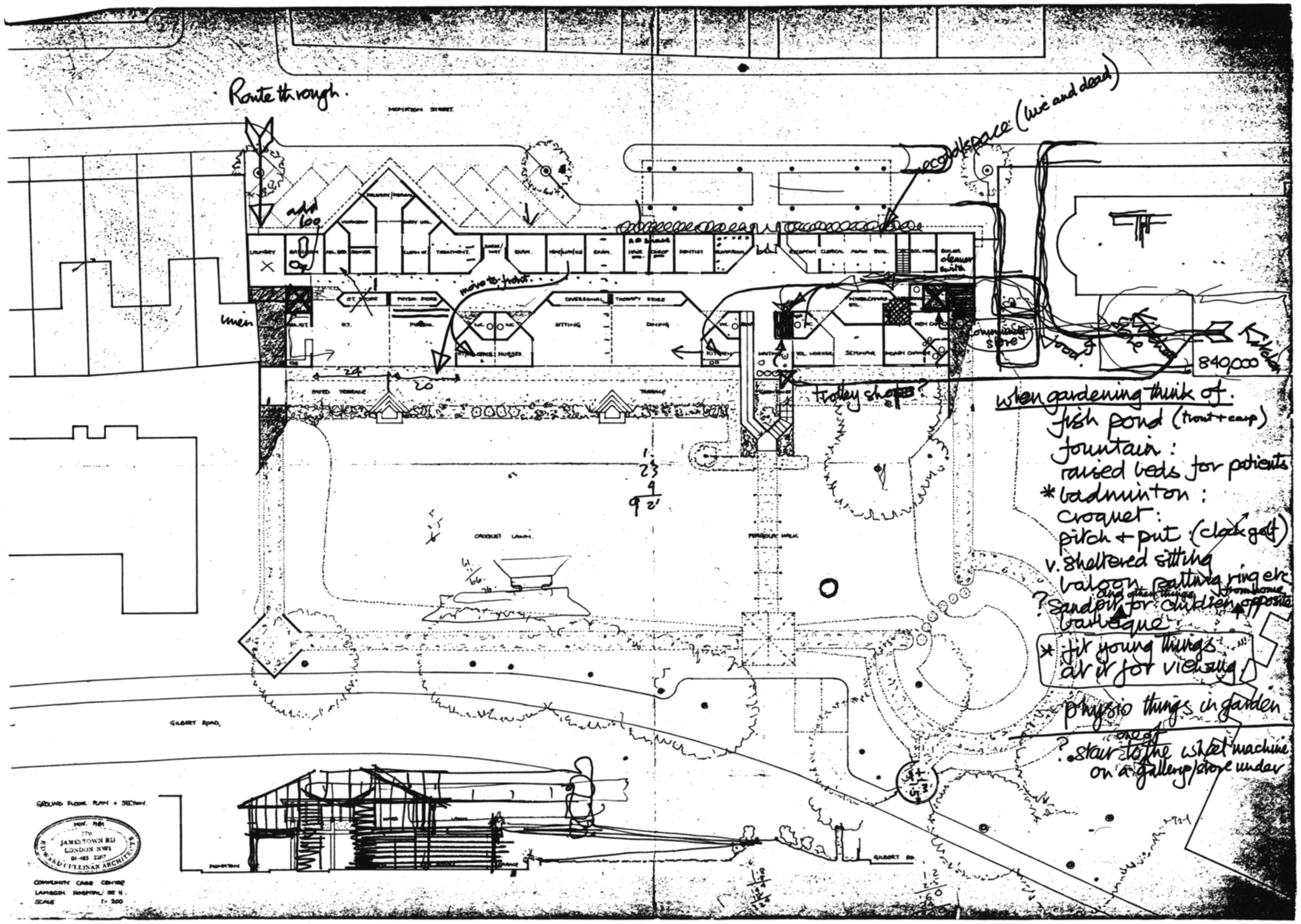
produces small room of $2{\cdot}9 \times 2{\cdot}9 = 8{\cdot}4^{\text{m}\square}$. *
big room of $6{\cdot}9 \times 4{\cdot}9 = 33{\cdot}81^{\text{m}\square}$ ($5^{\text{m}\square}$ too big

NOTE 5'= $1{\cdot}5^{\text{m}}$ corridors! unless small rooms shrink

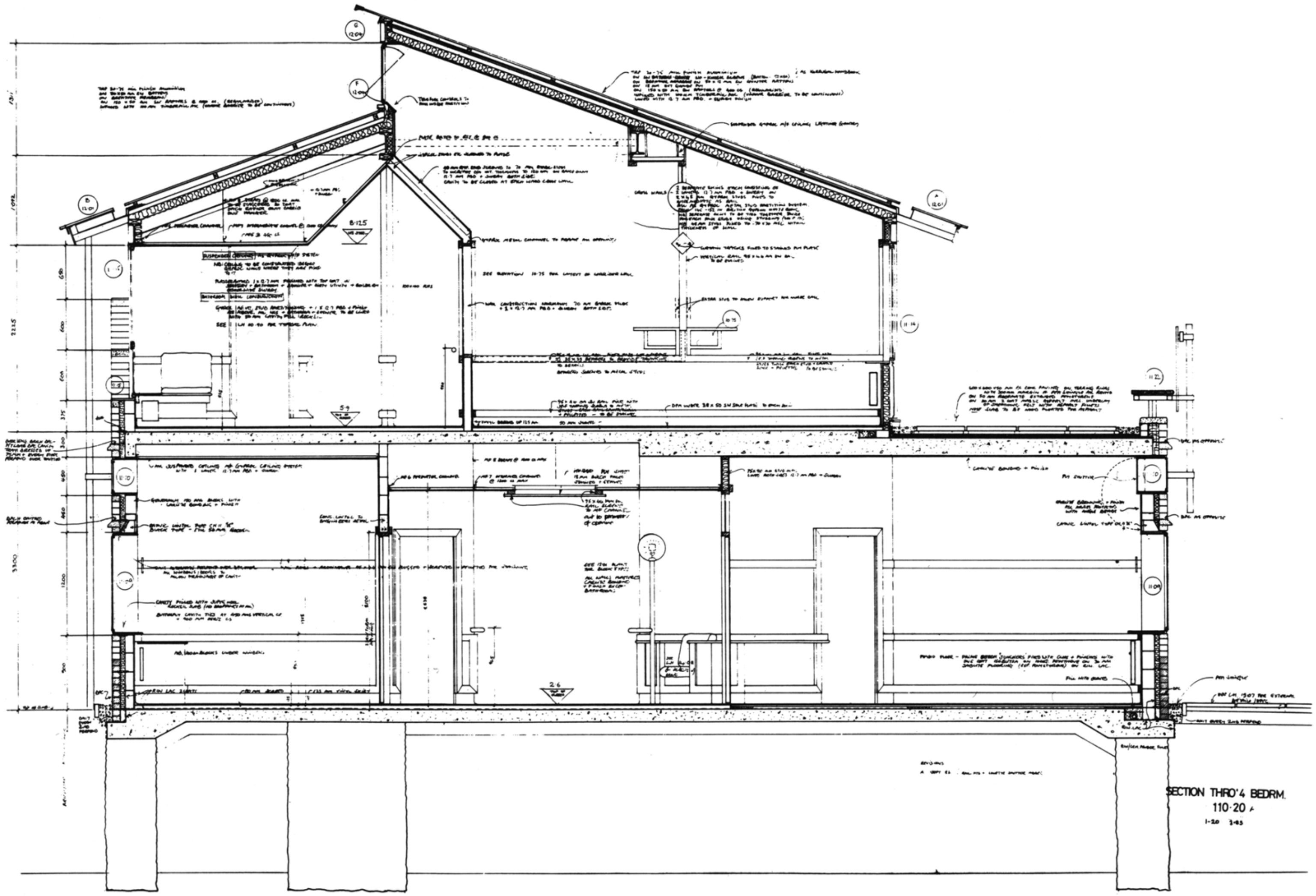
* dotted area = ½ corrid
makes it up to 9·85
which is a good one
for 22 of the rooms
in the 8 – 9·5 range

also the small room
(widened) + the corridor
makes the big room.

Really this is the one we can do most easily
especially if we can take the red strip out of the wa
(THE AIM IS 9–9·5 for small wards and 28 for large)


Route through.
MONKTON STREET
add loo
move to front
linen
24'
20'
PAVED TERRACE
TERRACE
CROQUET LAWN
PERGOLA WALK
GILBERT ROAD
ecological space (live and dead)
community store
food
kitchen
840,000
trolley shop?
OT. STORE
PHYSIO STORE
SITTING
DINING
KITCHEN
WAITING
VOL. WORKER
SEMINAR
BOILER
cleaner switch
when gardening think of.
fish pond (trout + carp)
fountain:
raised beds for patients
* badminton:
croquet:
pitch + put: (clock golf)
v. sheltered sitting
baloon, putting ring etc
and other things from home opposite
? sandpit for children
barbeque
* fit young things
or it for viewing
physio things in garden
? stair to the wheel machine
one of
on a gallery/store under
GROUND FLOOR PLAN + SECTION.
NOV. 1981
170 JAMESTOWN RD LONDON NW1 01-485 2267
EDWARD CULLINAN ARCHITECTS
COMMUNITY CARE CENTRE
LAMBETH HOSPITAL SE 11.
SCALE 1:200
MONKTON
GILBERT RD

16



17

and an amphitheater. The client commented that they wanted other things tested because they didn't like the idea of a big lawn. A year later the client asked when are we going to design a garden? Surprised, we said we had; the scheme you see here. The client replied that they didn't want just a flat lawn. To Nicholson, what is also of note about this drawing is that it shows how the office does do conceptual drawings—at times the Cullinan office has been accused, Nicholson says, of not doing them—but that these drawings are also seen as working drawings. The light pencil is a prefiguring of the next scheme.

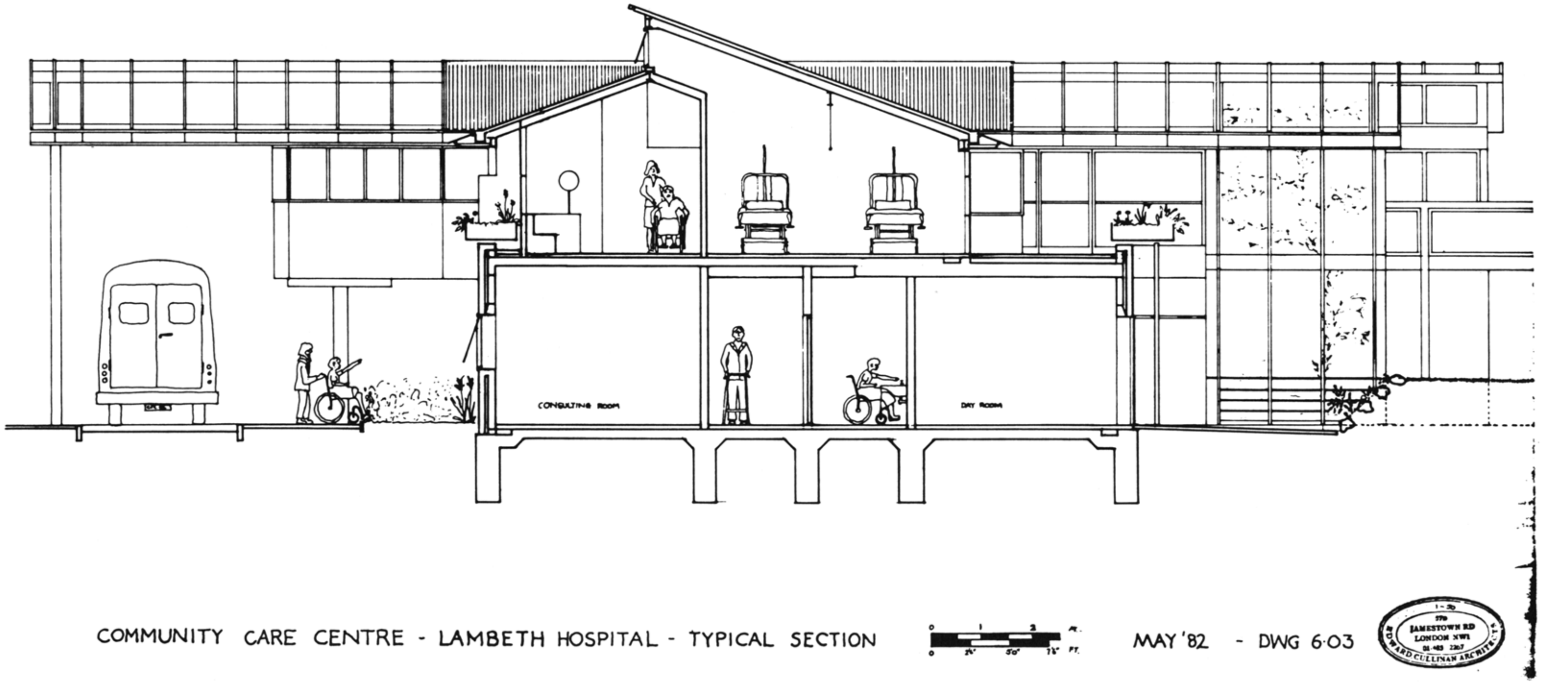
A section (figure 17) was drawn by Nicholson and used by everyone from the quantity surveyor and structural engineer to the contractor but not by the client. It was used to translate figure 18, after all the engineering issues were solved, into a sectional detail annotated with materials and dimensions. Key issues for the building scheme were not radically altered after this drawing, which is also now used for teaching.

The drawing in figure 18 is a presentation drawing produced for a public meeting and for the client. It is very nearly the final scheme and it was eventually colored to have slides taken of it. What is presented in this drawing by Nicholson is the idea of a two-story building with a solid base and a light top organized around cross ventilation, with eaves to deal with summer and winter sun.

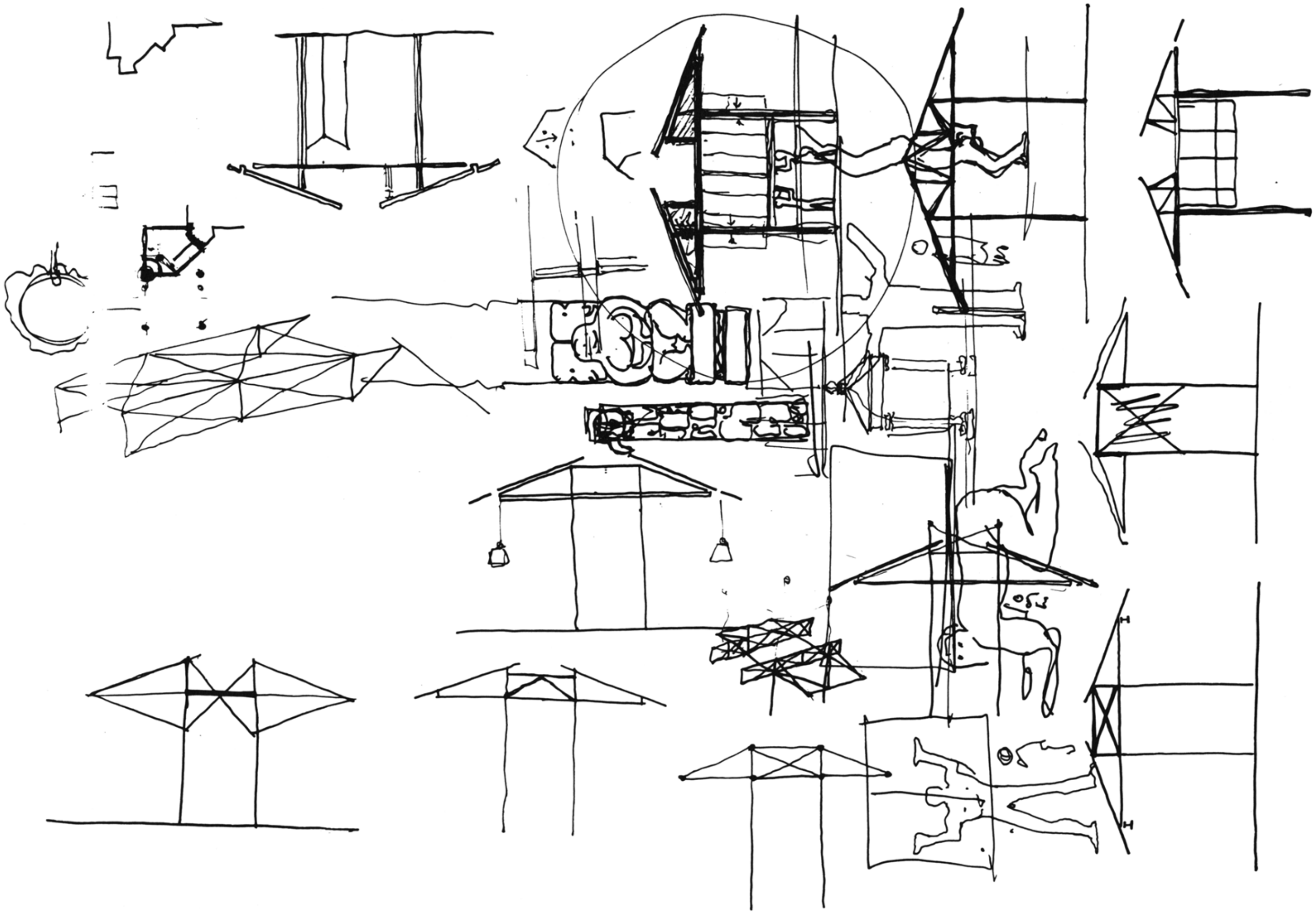
The drawings of people in figure 19 are there to deal with how to set up the columns at the front door. It was **a proposal for a totem pole we offered to make ourselves out of all the faces of people involved in the project. [It] was refused by the client.** As a result of this drawing, which is for Nicholson a record of an internal conversation, another drawing was produced and sent to the engineer.

The working drawing of the toilet in figure 20 is, for Nicholson, an example of a "good working drawing as working drawings go" and was included to illustrate the pride taken by the office in its working drawings and also to illustrate that such a drawing will often be done by a senior member of the firm (Nicholson did this drawing).

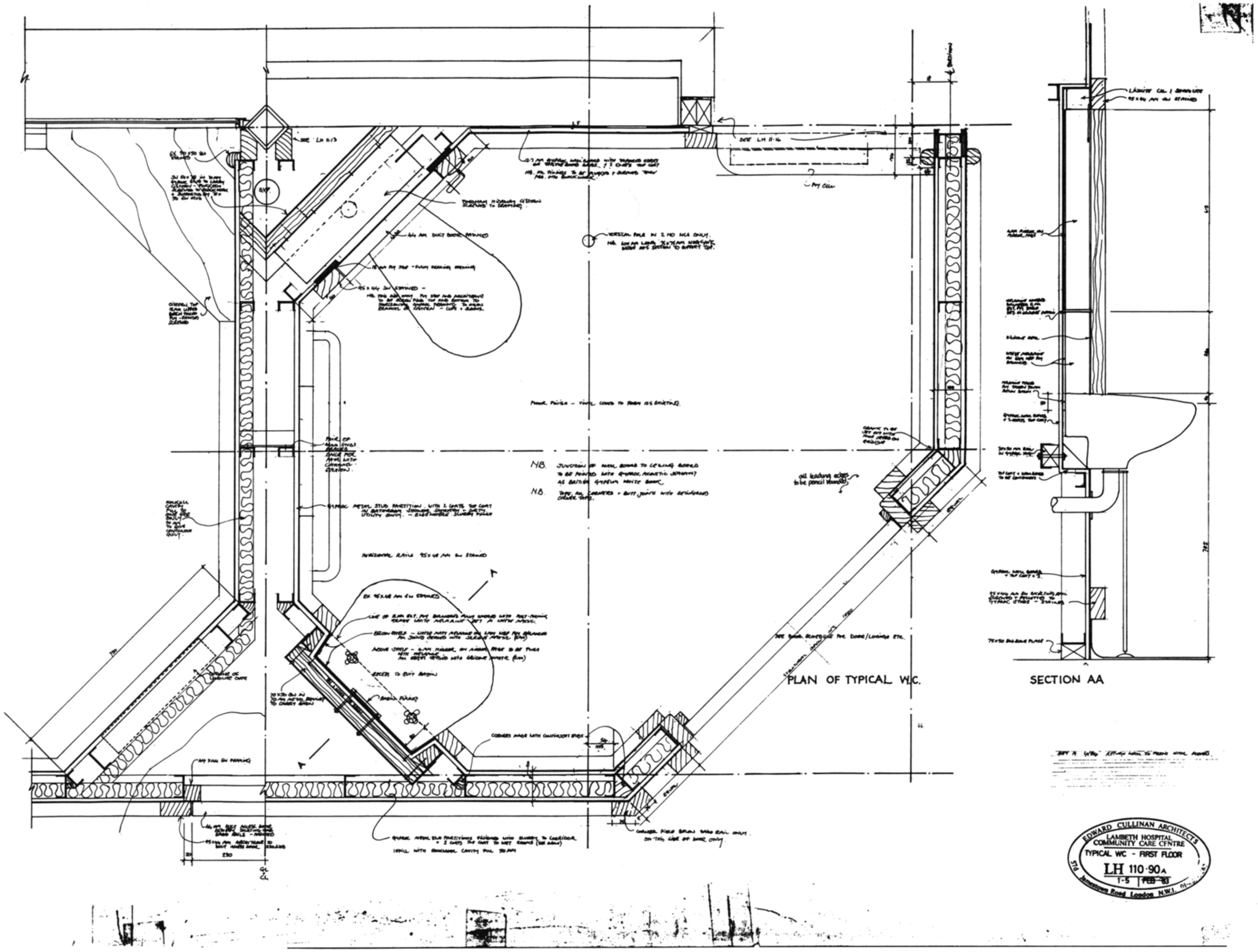
While the exigencies of practice demand that others do some of the detail drawings and realization drawings, for Cullinan the whole nature of the architectural process demands that all types of drawing be done by everyone in the office. Not only should all drawing, at least in principle, be nonhierarchical in the social process of design, but conception, development, and realization, as well as the public presentation of one's architectural ideas, for the most part should not be artificially divided. Thus the use of working drawings and doodles at all levels of a project and for all the parties concerned with the project. Drawing for Cullinan is not merely a tool; it is the way architects test and present both the technical and the ideological directions they want their architecture to take.

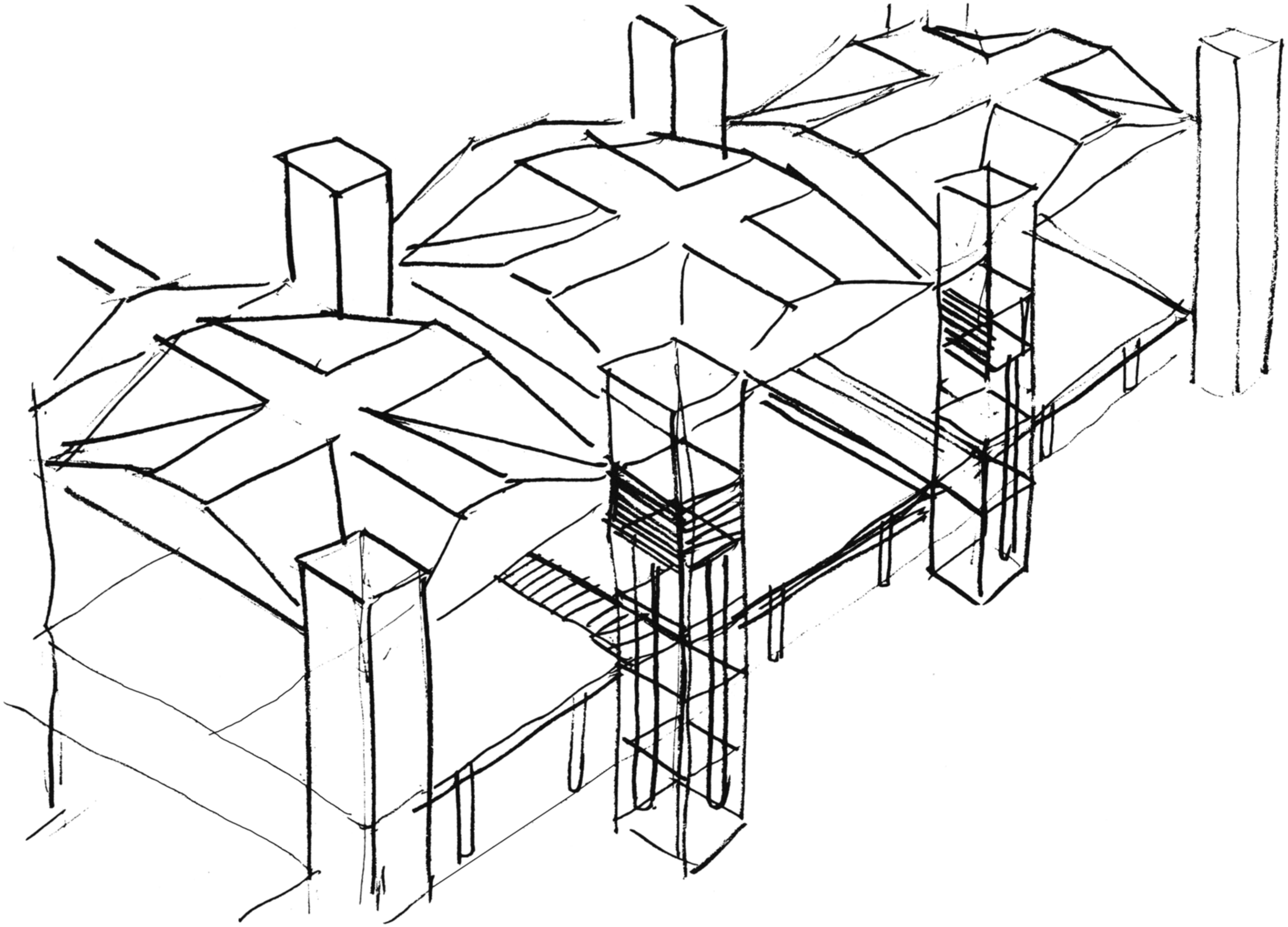

CONSULTING ROOM
DAY ROOM
COMMUNITY CARE CENTRE - LAMBETH HOSPITAL - TYPICAL SECTION
0 1 2 M.
0 2'6" 5'0" 7'6" FT.
MAY '82 - DWG 6·03
1 - 20
57b
JAMESTOWN RD
LONDON NW1
01-485 2267
EDWARD CULLINAN ARCHITECTS

18



Edward Cullinan *Edward Cullinan Architects*


PLAN OF TYPICAL W.C.
SECTION AA
FLOOR FINISH – VINYL COVED TO FORM AS EXISTING.
N.B. JUNCTION OF WALL BOARD TO CEILING BOARD TO BE POINTED WITH GYPROC ACOUSTIC SEALANT AS BRITISH GYPSUM WHITE BOOK
N.B. TAPE ALL CORNERS + BUTT JOINTS WITH REINFORCED CORNER TAPE.
all leading edges to be pencil rounded
EDWARD CULLINAN ARCHITECTS
LAMBETH HOSPITAL COMMUNITY CARE CENTRE
TYPICAL WC - FIRST FLOOR
LH 110·90A
1-5
FEB 83
57d Jamestown Road London N.W.1.



Spencer de Grey *Sir Norman Foster and Partners*

Sir Norman Foster and Partners, a firm of over 120 people and responsible for some of the most important buildings in the last 20 years, places a "tremendous emphasis" on drawing, in the words of Spencer de Grey, a partner in the office: **I think drawings play a vital part in all the stages of the work we do here. Norman himself is a very fine draftsman, as the early sketch for Stansted and others show [figure 21]. I think the standard of drafting in this office is unusually high. And I think a great deal of pride is taken using drawings as a means of communication both to ourselves and to the world outside.**

The office uses a whole gamut of drawing types, but what is unique to it is the use of very large-scale semi-freehand exploratory drawings to scale at the development phase of design, where **we will take an element or an area of the building and explore it in detail quickly so that we are moving the design forward at two levels: the strategy design and the detailed design. One of the features of our completed buildings is the very considerable attention to detail and the relationship between the detail and the overall form of the building.** Given the nature of the Foster designs, there is a continuing reliance on hard-edge drawings, which is absolutely essential to the communication of certain facets of any Foster project, not only for working drawings but also as the project moves from conception to design development and finally to realization. Three-dimensional perspective drawings, too, play an important role along with models in the generation of a design from the earliest explorations through to its realization: **We believe passionately that any aspect of design has to be explored three-dimensionally. We achieve that exploration with three-dimensional freehand sketches, and obviously with models . . . sometimes one- to two-day sketch models . . . which can be of a detail, even a full-size scale model. You will find that the office uses models at a very early stage of a project which then continues right through the whole process.** Along with models and freehand drawing, the Foster office has come to rely more and more on computer drawings: **We now have a very sophisticated system running in the practice, which is used in two ways. It's used for the more detailed production coordination of a building design, but almost more importantly we are able to do sophisticated three-dimensional drawings using the computer [figure 23]. However, no three-dimensional drawing, however accurate or sophisticated, is a substitute for three-dimensional physical models.** What is more important is that **it is difficult to imagine an architecture practice where drawings aren't absolutely essential to the way they work.**

Because the Foster office sees drawing as so essential, the office uses a whole range of drawing types in practice and does not have any set vision of what drawing style to adopt: **We are constantly challenging the style, the role of drawing in order to push forward the ability**

of that drawing to convey information. Thus one can see over the history of the office a shift in the types and styles of drawing that have been employed in the creation and realization of a design. For example, most probably those on the outside who know the office's work would suggest that it has a reputation for precise and elegant hard-line drawings. This emphasis probably came from a **fascination with the technical content of a project which is carried through into the presentation drawings, and the schematic drawings at an early stage.** But as problems met in practice have changed, so, too, has the manner of drawing. When working on the Hong Kong and Shanghai Banking Corporation building, the intense pressure to convey extremely detailed information to the contractors led to the development of semi-freehand drawings done accurately to scale. These drawings have now become a part of the practice's way of working—a new approach to conveying information that "has fed into every aspect" of the work done in the office.

In the Foster office, a great deal of care is taken to relate the drawing both to the kind of information the office wants to convey and to who is to receive that information: **We take a lot of care in thinking about how drawings should be used to convey information, because what is suitable for an internal review of a detailed design concept is probably very different from a full-scale presentation to a client. And I think a lot of time and energy is spent here selecting the right type of drawing to convey the right type of information to the right person. . . . And that is discussed from the highest level down: because conveying the message is at least half the content of drawing. One is aware of situations where brilliant ideas have gone wrong because they haven't been presented with the right drawings and vice versa.** At the beginning of a project, the office is most likely to start with a small team of designers under the guidance of the design partners, usually including Foster himself. According to de Grey, the office likes to see itself as not overly hierarchical, although all projects come under the critical eye of Foster. It is Foster, through a series of reviews with the design team, who generates the key drawings at the conceptual stage of the design: **Out of a review session . . . a drawing inevitably is generated. At such a session, we discuss things and that leads to a drawing or drawings. Norman spends his whole time drawing. He always has pencil and black book. Everything we do is, in one way or another, related to the drawn image.** Such images could be as diverse as diagrams of financial issues at a financial meeting, or the way in which two pieces of steel come together in an important structural detail.

Design reviews happen both formally and informally throughout the process of design. As the design team works, the project director responsible will sit with them and resolve issues. Through these meetings, he sets out directions for the design as it develops through the whole process: **Norman does draw an incredible amount. . . . And so out of a design review session would come a lot of drawings done there and then both by Norman and other members of the design team. But it is absolutely not one senior person, as it were, marking up other people's drawings to show the way a particular issue should be developed. . . . People are encouraged to develop design ideas themselves. Obviously that needs overview and control, but I think we have successfully established such a system.** Control is maintained through design reviews and is the principal way that directors can oversee a project, especially as it moves into the development stages. The informal gatherings of a project group also serve to aid in internal communication and exchange, which in turn motivates the whole team.

At the beginning of a project most people in the office do freehand drawings, whether plans, sections, elevations, or the more exploratory three-dimensional sketches described earlier. **But the general feel of those drawings would be fairly loose.** The key early in the project is to have a whole array of drawings and drawing types both to generate an idea and to communicate it within the office as well as to the client and others outside the office: **For instance, consider a project like the Nîmes Médiathèque, now completed in the south of France. It was the outcome of an international competition which we won. The competition drawings for that were a fascinating mixture of types. On the one hand, you had Norman's conceptual drawings, and the explanatory diagrams that convey to the jury, and people thereafter outside the practice, the essence of the design and the issues which we felt were important. These drawings were contrasted with really very meticulous hard-line drawings. They were a complete counterpoint one to the other. . . . The other component of the presentation was the model and then there would be freehand perspectives, which would be quite different from Norman's drawings, illustrating some key view of the building inside or out. . . . This is a fairly early stage of a project and you get such a variety of different drawing types. I think playing the one off against the other is very important.**

While the Foster office takes responsibility for the preponderant amount of drawing in any project, obviously their own drawings are supported by those of the engineers. Typically engineers are not given a conceptual *fait accompli* but are involved from the earliest stages of the process. **It isn't a question of us imposing far too late in the day a structural concept upon the structural engineers. I think the nature of the structure to be designed comes out of a very close dialogue between this office and the structural engineering office. But there obviously comes a point when the detail is agreed and the engineer has to go away and produce the drawings for the contract tenders.** But while the engineers' responsibility for the formal drawings is more or less institutionalized in architectural practice, the engineers and architects still have to communicate, not only through words but through sketches and drawings made by both parties. The engineering firm draws when involved in group meetings and also when they go back to their own office to work out the project. To make tough decisions about the design **means reviewing, challenging, and reviewing again. And the drawings of course are essential to that. Without drawings you couldn't make any progress at all.** To have the engineers like Arup's involved from the very beginning is important to the Foster office. For the Stansted Airport Terminal building, the engineers were involved from the earliest days, suggesting structures but also details and then dealing with the building's construction sequence, so essential for the realization of a good design. Because the engineers' drawings are a critical part of the process, **I think one quite interesting thing is that they [engineers] will come back with what one might consider a fairly straightforward drawing. I don't mean that in a derogatory sense. People in the office would then translate it, probably using three-dimensional computer perspectives or freehand interpretations. Also, over time, firms we have worked with have changed their style of drawing because of the way in which we involve them in. I think they have learned the importance of drawings and the way in which they convey information.**

The care that the Foster office likes to see in the drawings developed for the detail design reflects the care that it pays to its own presentations to clients and the public in general: **I think we take very great care in the selection of drawings that we show to clients. For every presentation we make to a client, we probably have much more material than we eventually show. Norman has a very good adage: "A presentation is as good as your worst image." You can actually ruin the message you're trying to convey at the presentation by including just one drawing that is wrong.** For the office, the problem with presentations is that a drawing might communicate a given message within the office with colleagues but might suggest something entirely different to a client. This is because the client may not be familiar with architectural drawings. **We've been in a number of situations where we have used the wrong drawing and regretted it afterwards. So, whereas I don't think that the quality of drawing we show in the office is different from what we show outside the office, the selection process is rather more rigorous. However, you could do a presentation for a client entirely with drawings on detail paper, for instance, and that might be entirely appropriate.** The Foster office does not want to hide the process of design but rather to explain the design concept to the client. It is therefore important to assure that the content of the design is clearly represented by the drawing. With that in mind, the office will often present clients with the design concept as it is being worked through at various stages. This is also true when the office is thinking about a series of design options. In each case, though, it is necessary to have drawings that best represent the stage of design being presented: **I think we always go out of our way to try and explain to any client our thinking, the reasoning and the development behind any design. That is essential but probably not very common. We think that it is important that when you are proposing a solution, or even on some occasions a number of possibilities, you have to explain the background thinking. So if you look through the archival material at the office, you would find as many diagrams explaining the background of the design as you would find drawings actually illustrating the design itself. We very much like people to see the way in which we think; it immediately gains the confidence of the client. We do not think it is enough to go in with a pyrotechnic display of finished conceptual drawings without trying to explain the background and rationale.** Nonetheless, there are drawings that are best not presented to clients because of their abstract qualities: **We would not use a huge number of very formal hard-line drawings (the more traditional plans, sections, and elevations), although it is actually the type of drawing that comes easiest to architects—when we talk to a client, we prefer drawings that convey what you are trying to achieve.**

At the same time, hard-line drawings are essential for the development of the design, even though for architects too they can at times be rather abstract: **I suspect we all fool ourselves about how much we actually understand from those sorts of drawings. I think what they do is show a pattern of geometric relationships of one space with another. And I can't think of a better way of doing that. But I suspect that if you sat a number of architects around a table with a plan and asked them to go away after ten minutes and describe or draw freehand in three dimensions their interpretations of that drawing, you would get quite different results.** Within the office itself, the ways that individuals communicate with drawing varies to a great extent. There are some, including Foster, who are very good at freehand drawing and use it to communicate with others. Others rely more on hard-line drawings, although the partners like to encourage the use of freehand sketching: **I think that architects are too rigid and fall back on hard-line drawing as a technique too easily because it is an accepted method of communication. I think they miss a lot of ideas doing that. And when you are talking on site later on in the process, conveying information in accurate three-dimensional freehand is a far better means than the more sterile drawings that are normally used.** De Grey is not arguing that hard-line drawings are unnecessary, only that they are at times overused: **We couldn't just tear up the two-dimensional drawing. I**

think describing the precise relation of one object with another can only be done in the more traditional form. I only wish people were encouraged to be more fluent and accurate in freehand three-dimensional drawings.

Hard-line drawings are also critical when one moves into the realization stage of design drawing: **When we get to the detail design stage and production drawings, the drawings need to be more definitive, hard-edge, and precise.** At this stage, they also ask the contractor to add his own drawings: **The office has an interesting tradition of working very closely with industry. Although we go out to tender with very detailed drawings and specifications, we ask the contractor to either adopt or supplement these with his own drawings and on occasions take overall design responsibility for the detail, production, and installation of those elements.** This is done because the contractor is often far more expert at certain details or techniques within a design than the architect: **We feel that ultimately the contractor on special installations, such as the external cladding, is the expert in the field and has the greatest knowledge. Therefore to get the best possible product it is better to indicate in some considerable detail what you want to achieve and ask the contractor to realize it. I think this has been very successful.** For such an operation to be successful the drawings are critical: **With the drawings we provide the contractor it is vital that he understands the intent. If you don't define the problem accurately you get a very loose tender design back with the corresponding risk to the program and cost . . . so it is vitally important that we convey what exactly we want to achieve.** Not only should the architect's drawings be clear and precise, but the contractors' drawings have to be of a high standard for the architect himself to be able to judge the quality of what has been produced.

The close relationship between the Foster office and others in the process of design has led, the office hopes, to higher standards of drawing for all the participants in the design process. **I suppose it all emanates from a passionate interest in the way things are built and the details—the details being critical to the success of a building.** Care with drawing signals the degree of involvement in a project: **Care and attention to drawings, whether it be a freehand sketch or a finely crafted drawing, immediately conveys to someone else the involvement and commitment of the office. If you get a sloppy drawing on a scrappy piece of paper you tend not to take that as seriously as a carefully considered drawing. It doesn't have to be hard-edge, but how you draw conveys an attitude.** It is for this reason that the office is so careful about what it is willing to show the public, whether an architectural public or the general public.

For the Foster firm, it is not only a question of the aesthetic quality of drawing itself but more importantly what the drawing conveys. Within the drawings are the qualities the office wishes to embody and the messages it wants people to understand. Drawing represents what the office believes and what the office does.

Stansted Airport outside of London, commissioned in 1981 and opened in March 1991 to critical acclaim, is the sort of major project for which the Foster office is noted: a project in which the technology used to form and structure the space becomes part of the functional attributes of the space. The drawings that follow reveal this concern for structure and function. What is of note is that the process of design was carried out over a considerable period and at the beginning was not continuous but proceeded in fits and starts.

Figure 21 is an early sketch by Norman Foster done in 1981, showing the potential for a large-scale roof supported by structural towers enclosing elements of mechanical plant.

Figure 22, an early but subsequent design sketch by Foster, shows the basic design strategy of a single-level concourse serviced from beneath and a lightweight enclosure above. Although a design sketch, it was used later as a presentation drawing.

By 1985, various design schemes were put to various tests using CAD, which was new to the office, through the production of three-dimensional options that explored the design (figure 23).

Figure 24 is a typical drawing produced during the early stages of design development in February 1983, and looks at the integration of services and lighting within the structural tree. It was used to explore the ductwork, light fittings, and maintenance access.

In figures 25 and 26, two model options looking in great detail at the relationship of the environmental services unit with the overall structure were used to decide which option worked better. Made by Chris Windsor, figure 25 shows the unit outside the overall structure while figure 26 shows it inside, the option finally selected.

Drawn by Michael Elkan of the design team, figure 27 is a three-dimensional study showing the basis for the final scheme. This drawing and others investigated and developed the integration of the indirect lighting at the top of the pod, the air supply gills, passenger information applied to the face of the pod with the air return, and maintenance access in the center. This drawing looks specifically at the various information systems that could be applied.

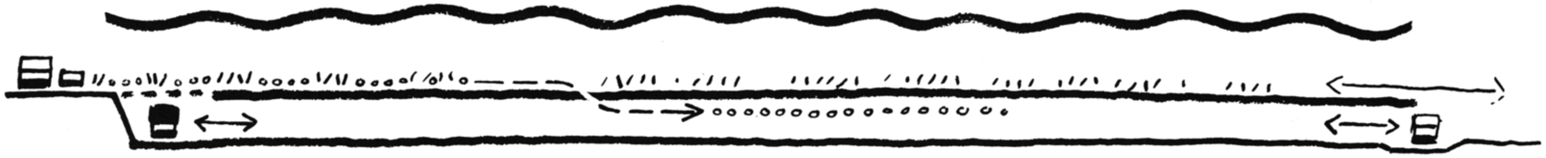
Figure 28 was done by Brian Timmoney as a presentation drawing and shows the repetitive nature of the square structural bays with the integral services. It was done to show the client how the structure and services module allows the building to be extended in the future. In addition, it represents the single-level passenger concourse, with undercroft below.

Plans were also used in the design of Stansted. Figure 29, done by Spencer de Grey, is one of a set of coordination and presentation drawings of the undercroft with the structure at 36-meter centers used by the contractors in evaluating costs. At this point the design was fixed. As de Grey points out, though, "As the design is being completed, the drawings get more detailed over time."

An exploded axonometric, figure 30 shows the final proposal with all the various elements of the pod and its relationship to the undercroft and structure. This started off as a development drawing but was constantly updated and thus became a publication drawing as well. It was drawn by different individuals at different times out of a series of other development drawings like that in figure 31, which shows the relation of the structure to the external cladding.

Figures 32 and 33 are drawings given to the contractor to guide construction of the project. The former was part of a tender documentation package for the circular staircase for maintenance access and was hand-drawn by Mouzhan Majidi. The latter is a pod construction drawing produced for tender documentation for the coordination of the construction of the pod. In all there were 19 tender documentation packages for the different services required within the structure, each by a different contractor.

In the end, for the Foster office drawing is an essential part of the crafting of their buildings, and it documents not only their design creativity but the care and the attention to the integration of all the functional and structural parts and details that go into the making of so complex a place as Stansted Airport.



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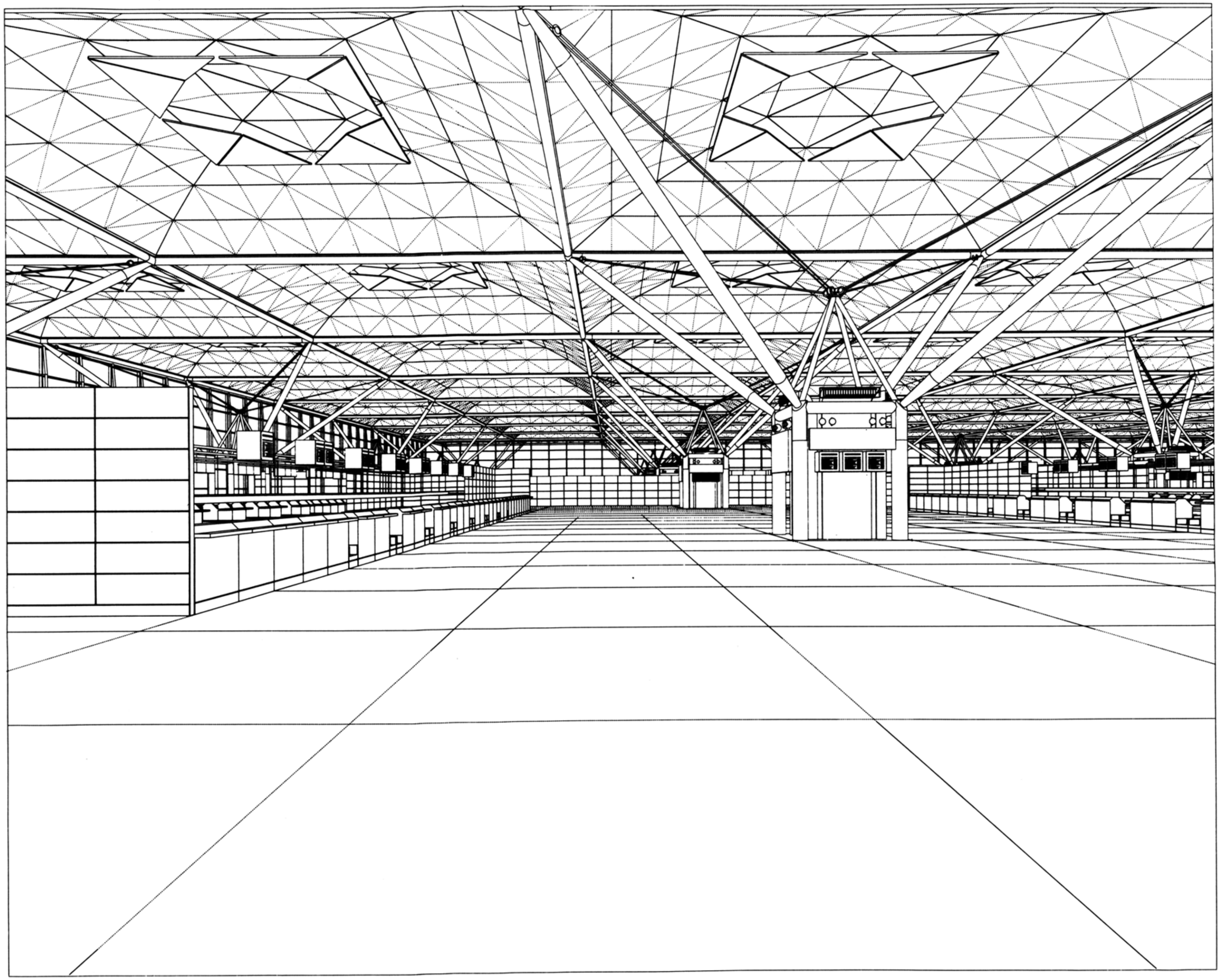
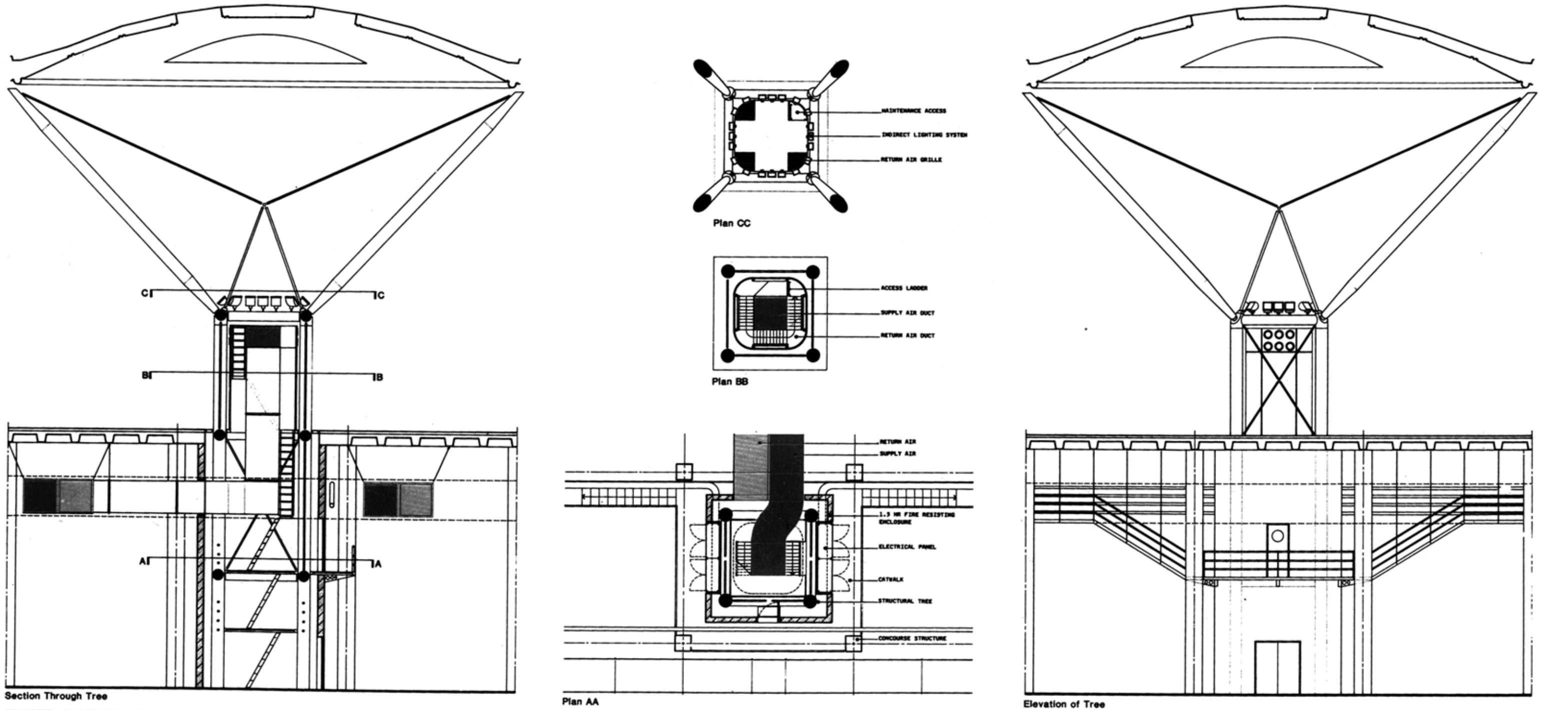
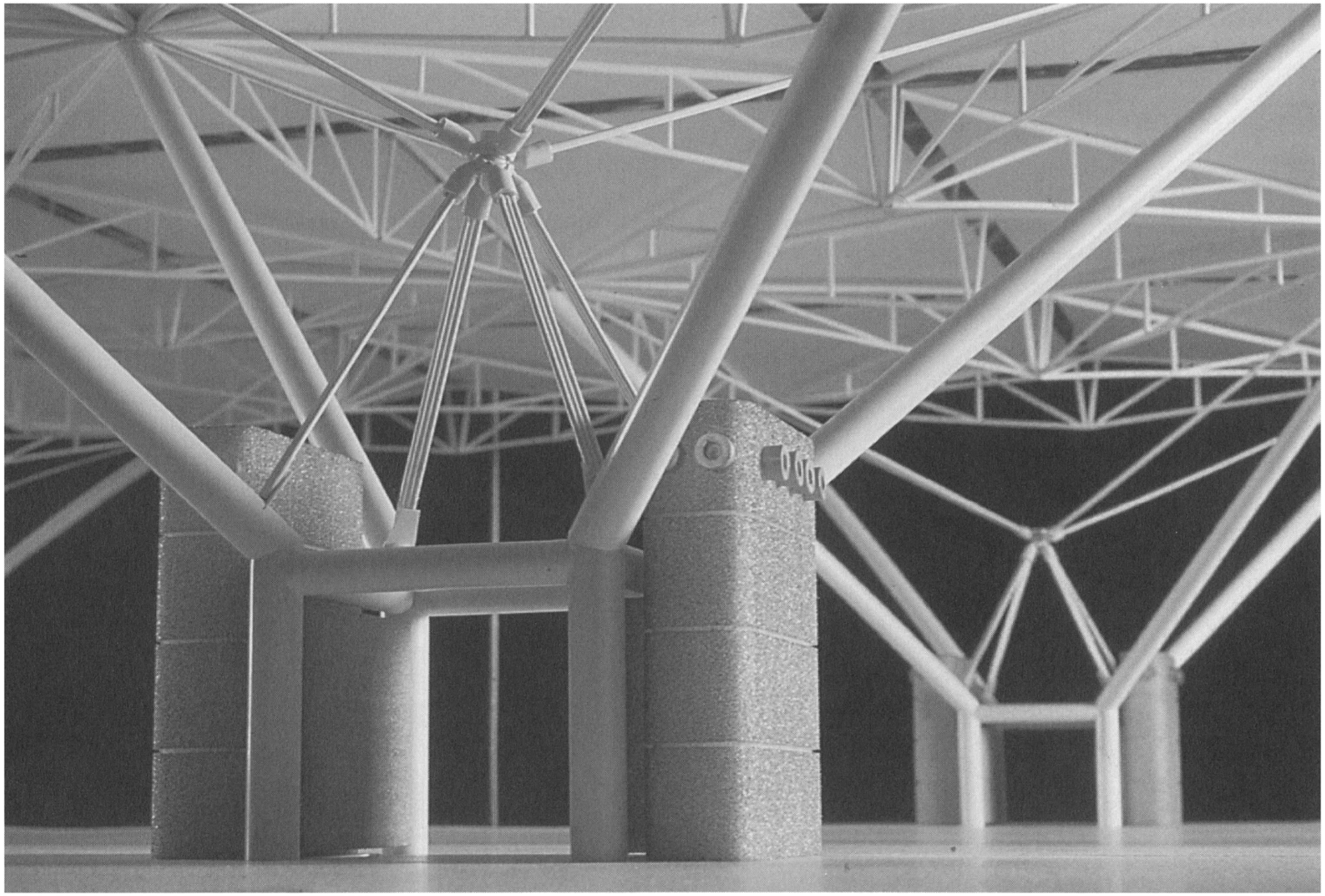
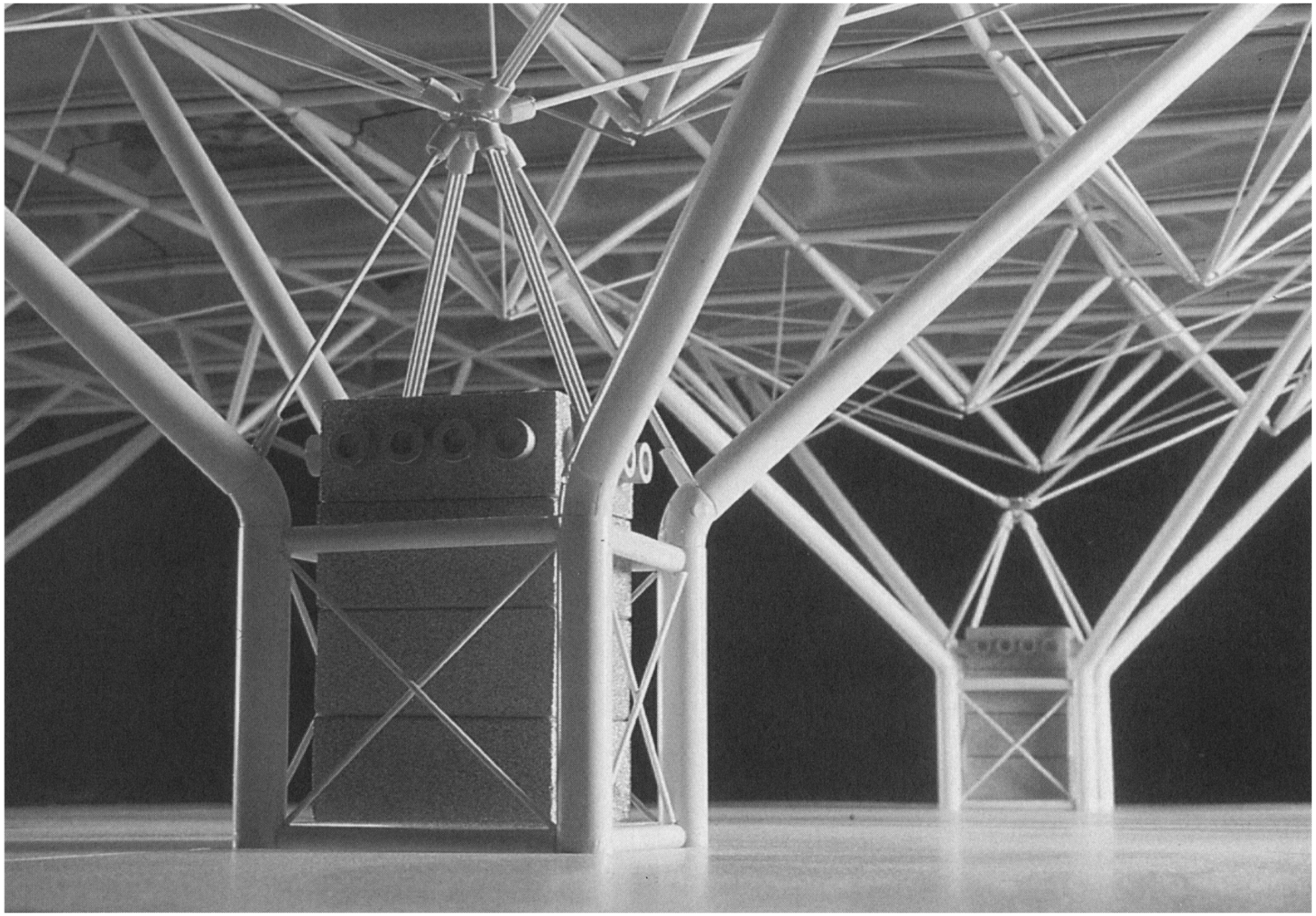




24 STANSTED PASSENGER TERMINAL STRUCTURAL TREES: SERVICES DISTRIBUTION





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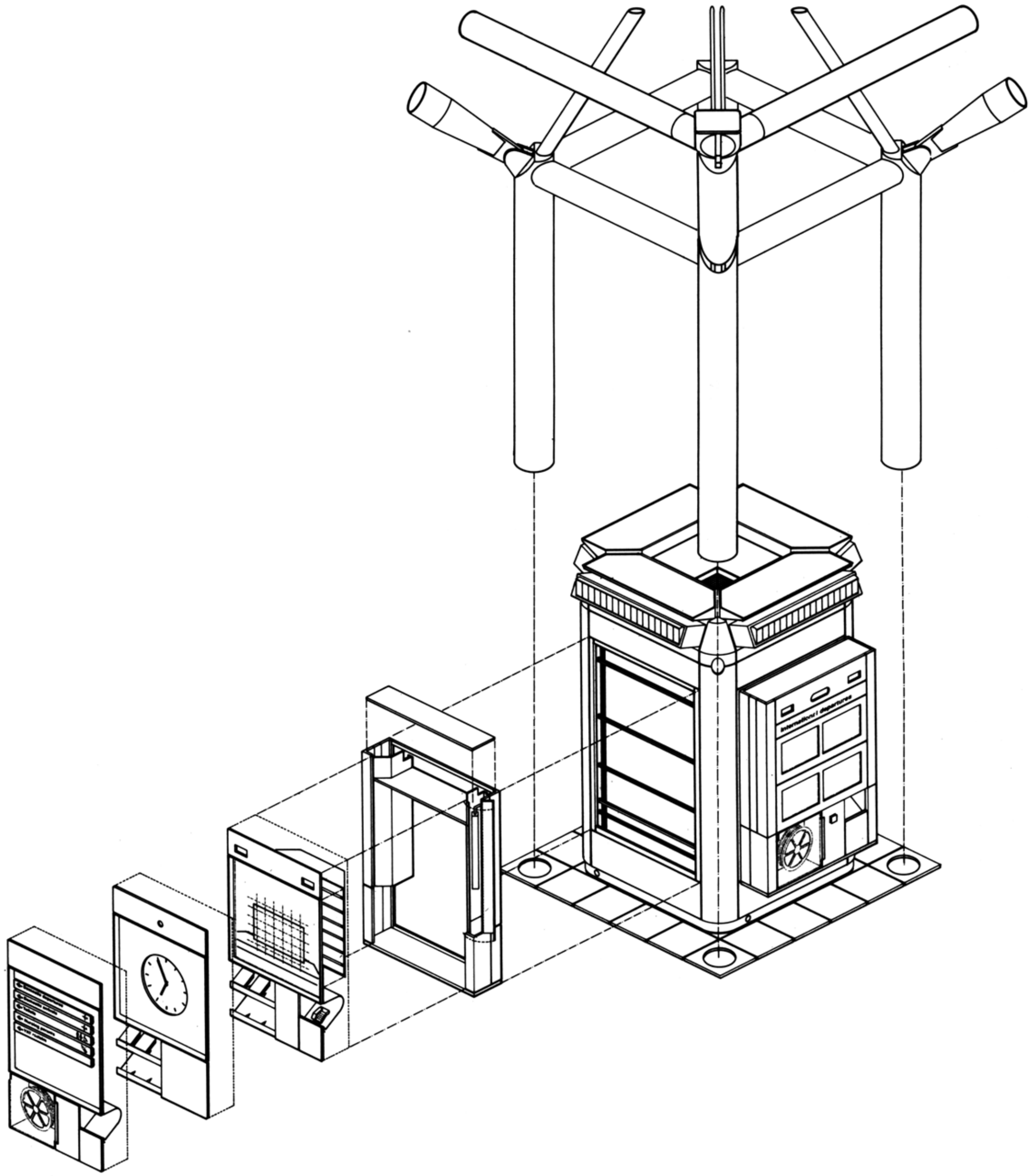
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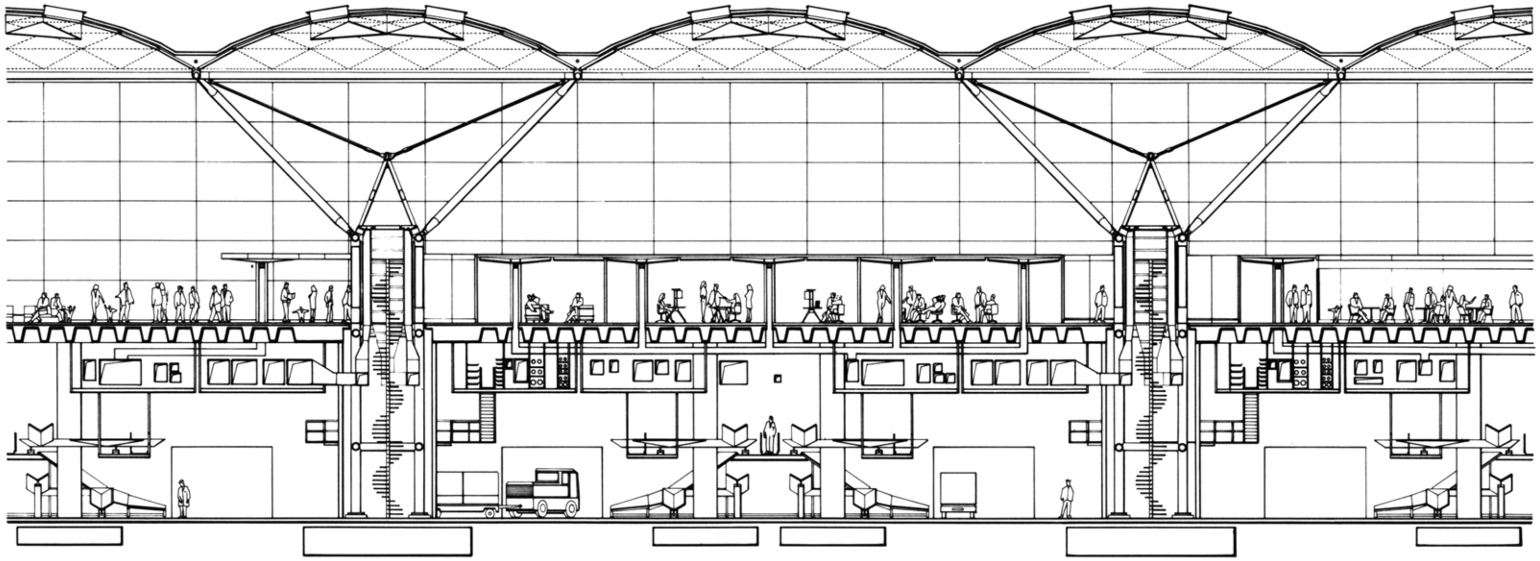

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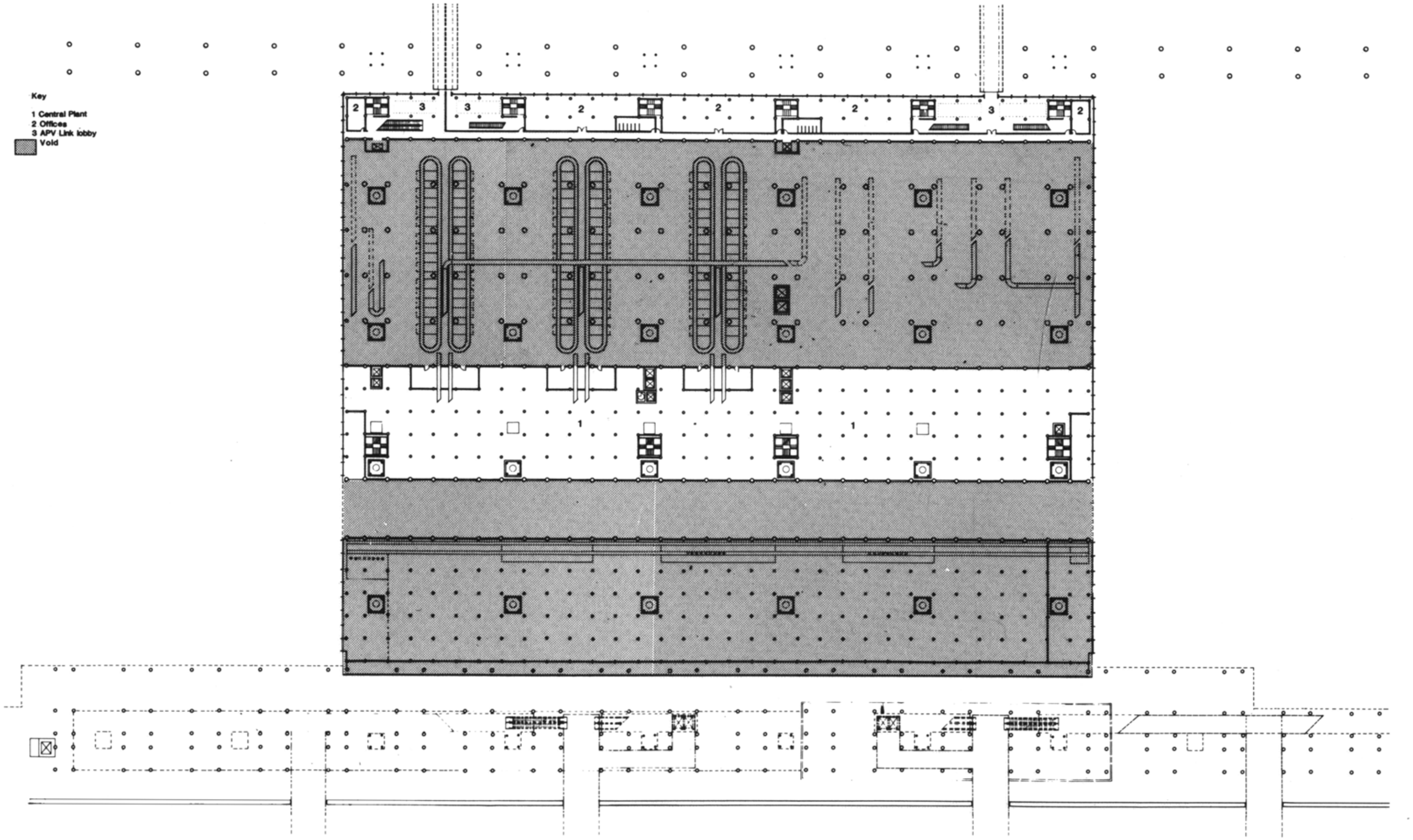
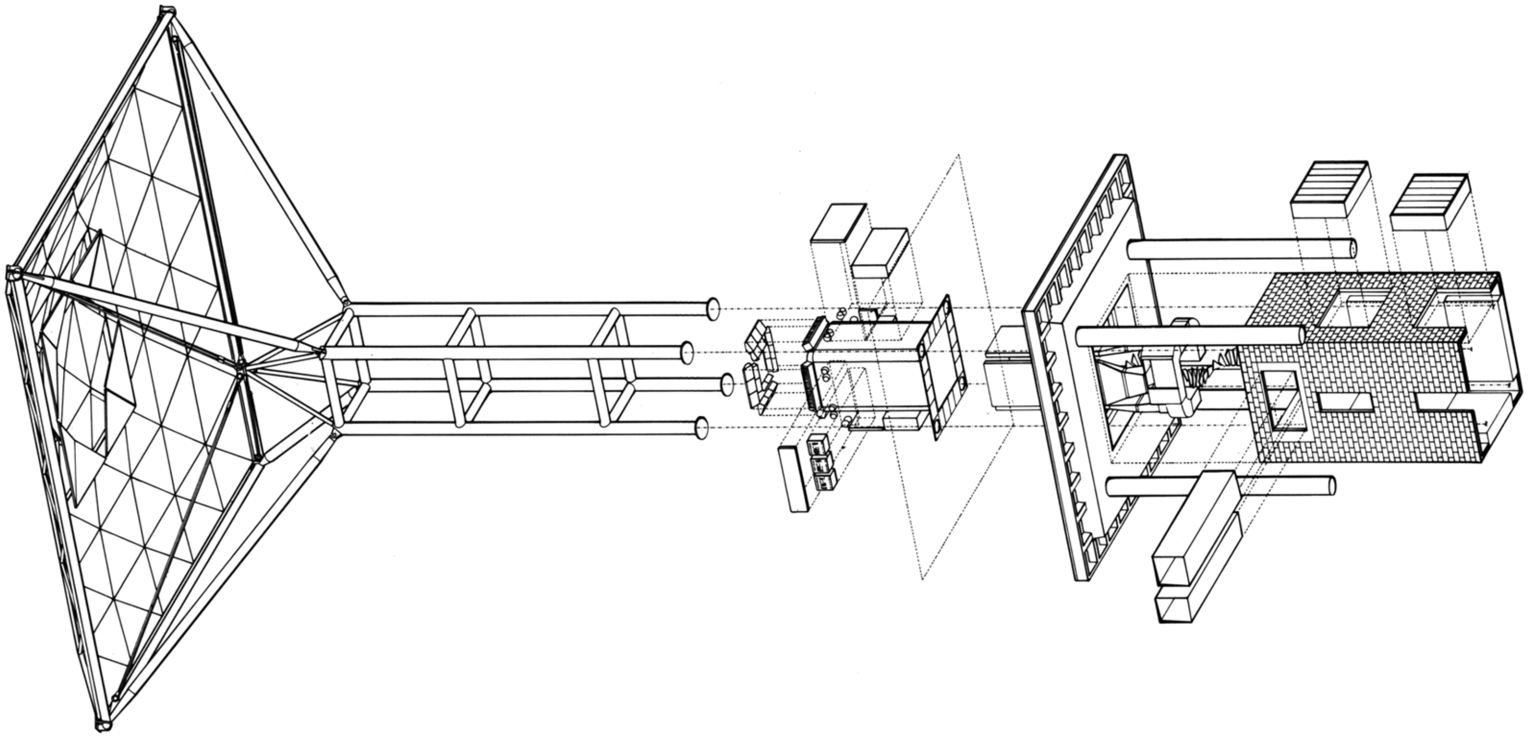


NEW PASSENGER TERMINAL STANSTED AIRPORT UNDERCROFT MEZZANINE PLAN 0 5 10 15 20 25 FOSTER ASSOCIATES MAY 1986 300/1001 29



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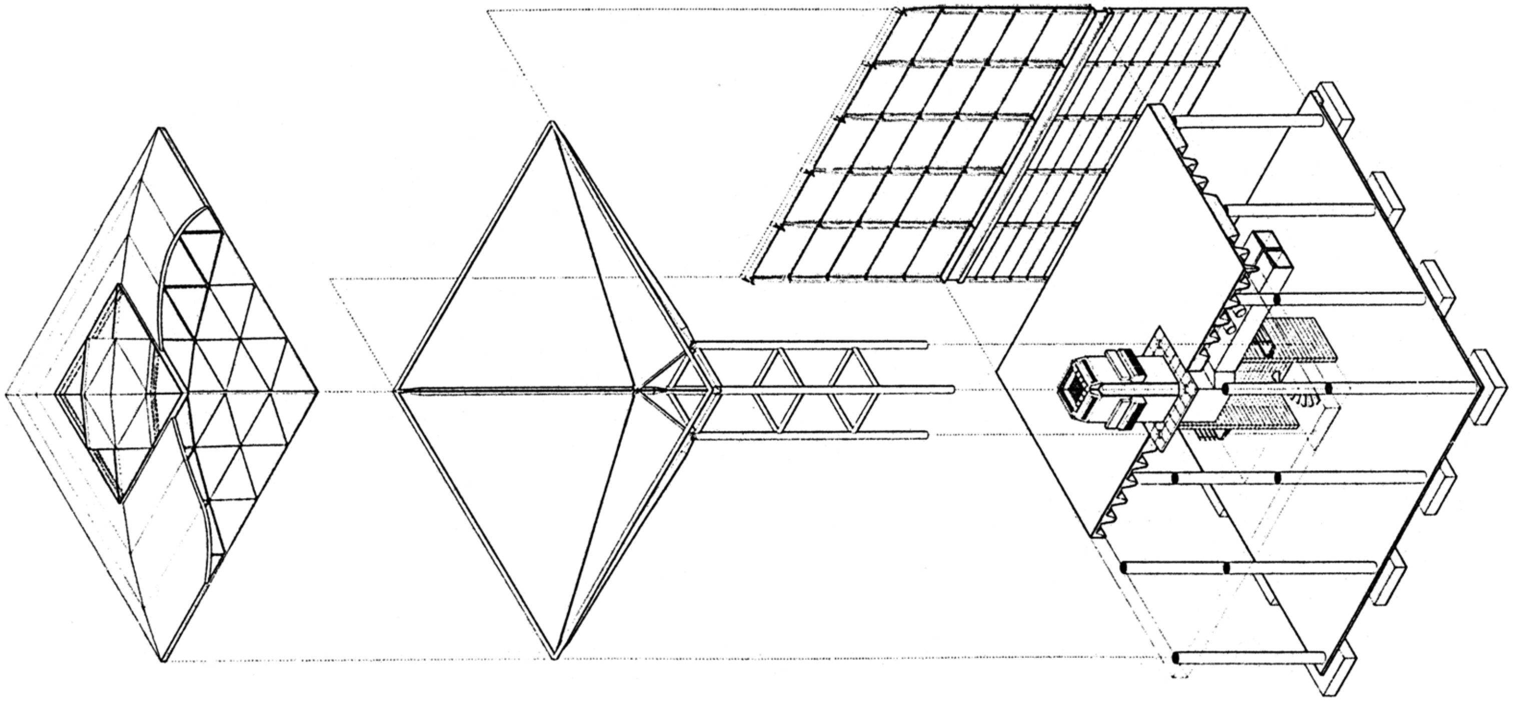

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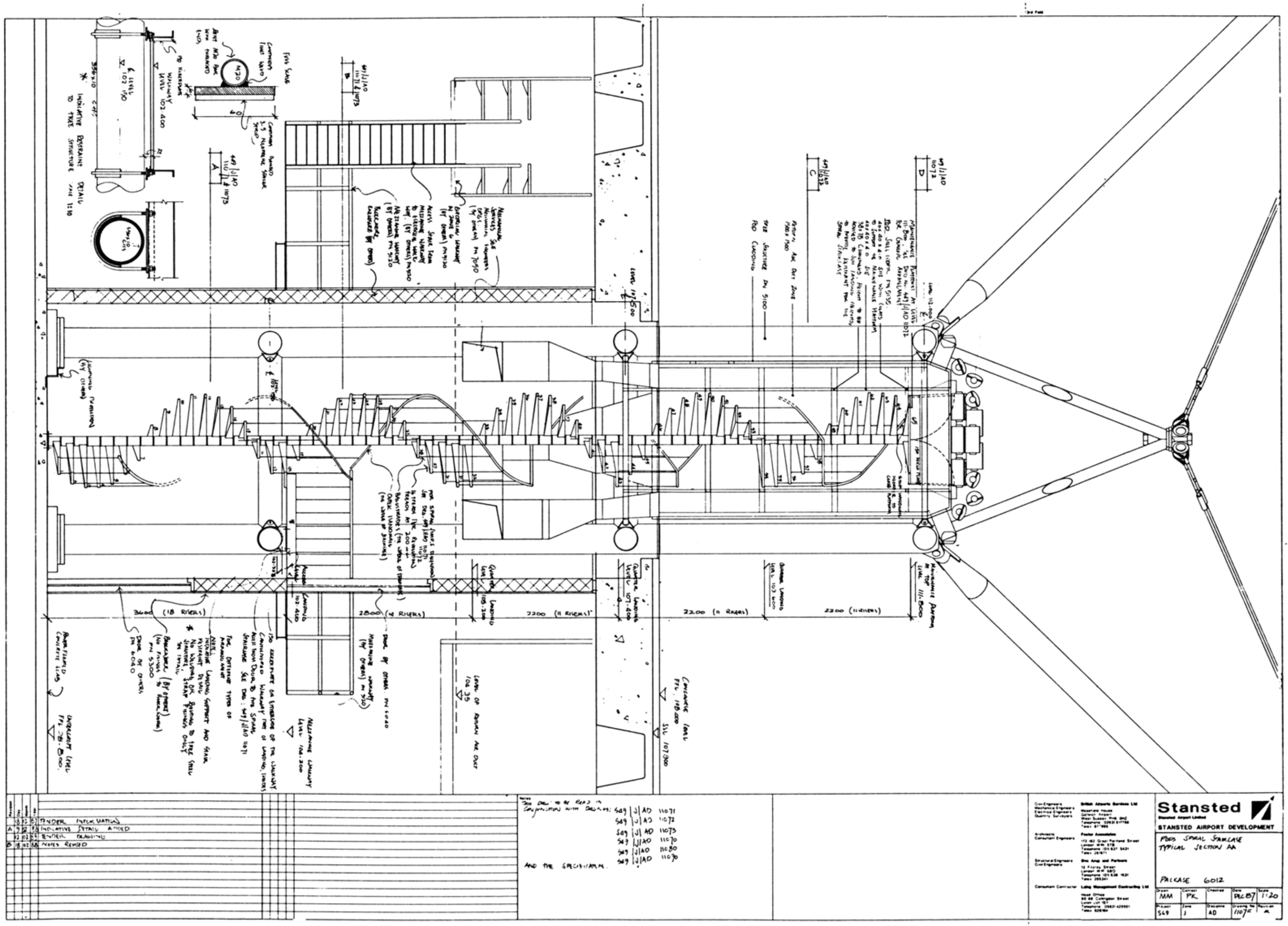
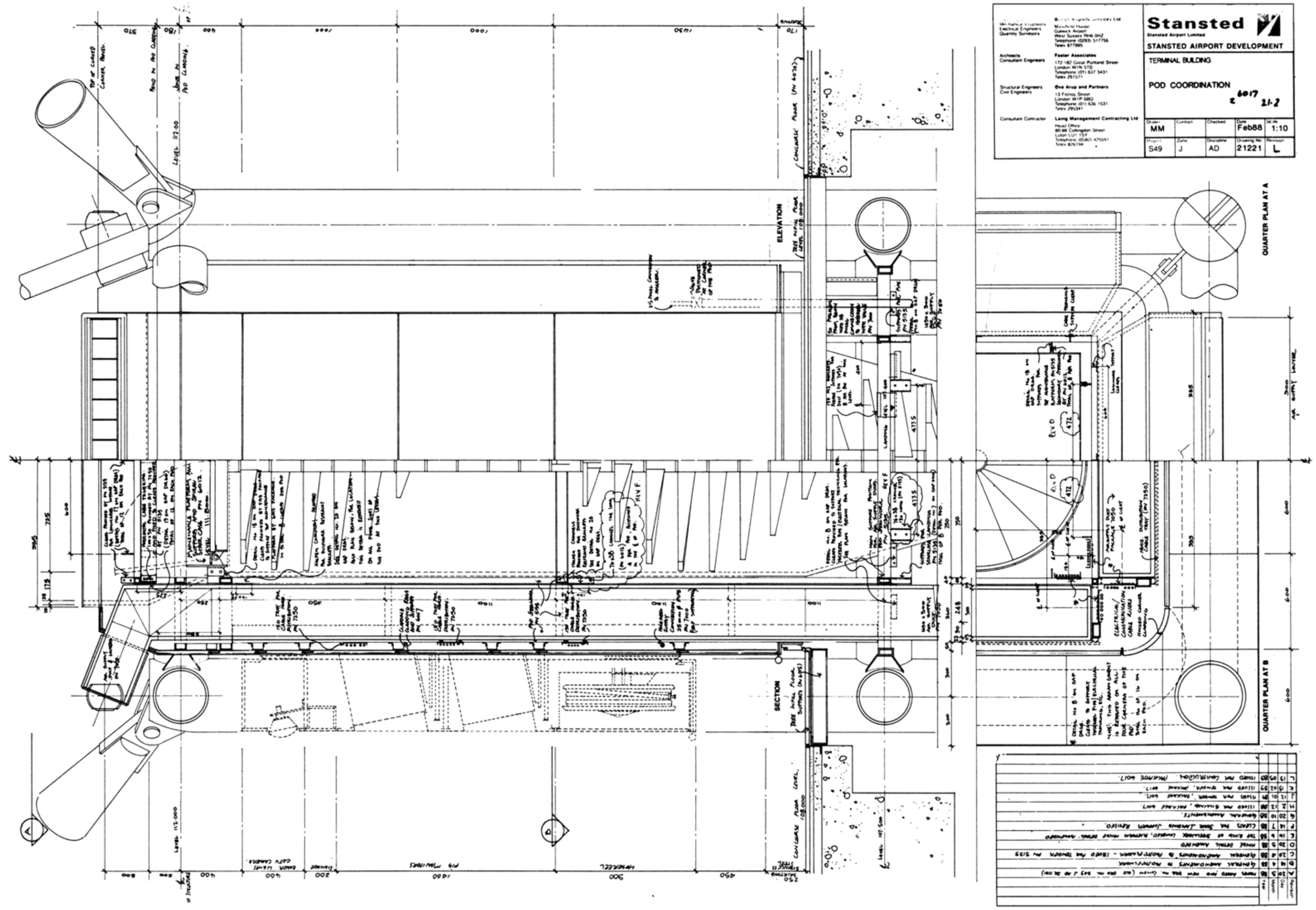
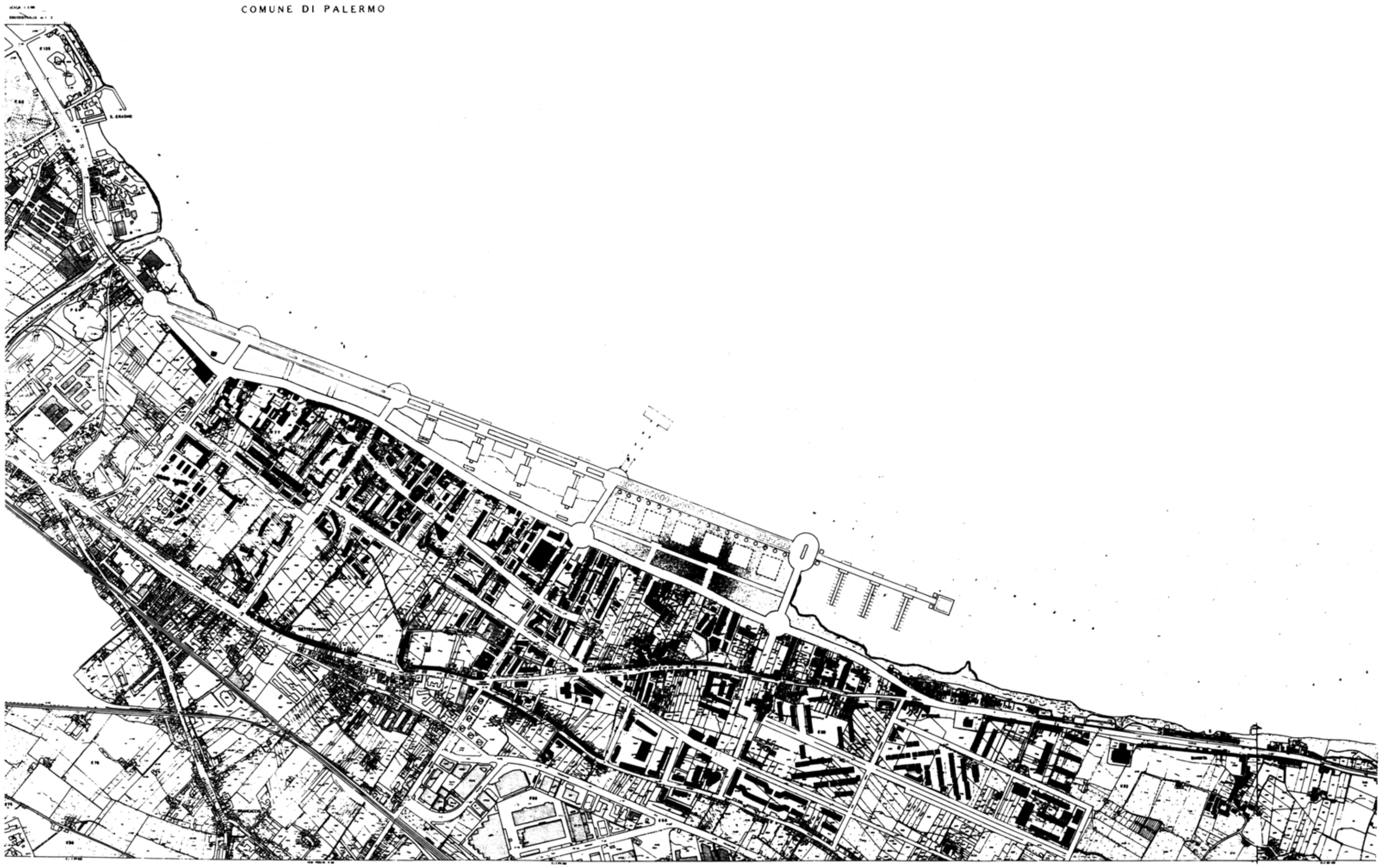

Stansted
STANSTED AIRPORT DEVELOPMENT
PODS SPIRAL STAIRCASE
TYPICAL SECTION AA
PACKAGE 6012
Drawn MM
Checked PK
Date DEC 87
Scale 1:20
Project 549
Zone J
Discipline AD
Drawing No 11076
Revision A
British Airports Services Ltd
Foster Associates
Ove Arup and Partners
Laing Management Contracting Ltd
TENDER INFORMATION
INDICATIVE DETAIL ADDED
NOTES REVISED
AND THE SPECIFICATION
3600 (18 RISERS)
2800 (14 RISERS)
2200 (11 RISERS)



Spencer de Grey *Sir Norman Foster and Partners*



COMUNE DI PALERMO
S. ERASMO

Jorge Silvetti *Machado & Silvetti Associates*

For Jorge Silvetti, a partner in the eight-member Machado & Silvetti Associates in Boston, Massachusetts, and a professor of architecture in the Graduate School of Design at Harvard, drawings **play a fundamental role [in architecture] in that they are the first realization of an architectural idea. . . . Architects never build buildings, they do drawings that are built by someone else. When we look at the actual concrete tasks of an architect, he draws. . . . Drawings are for me the language of architecture; how you create your ideas, how you evaluate them, and how you develop them.** Silvetti uses a whole range of drawings and drawing types to help him conceive and develop his architectural objects—whether these are buildings or representations for an exhibition about a proposed project. These drawings range from personal abstract sketches to conventional contract or what are otherwise called working drawings.

The clearest and least abstract drawings for people other than architects, in Silvetti's opinion, are those drawings that constitute the precise specifications of the building—working drawings. Subject to conventions that are shared between the architect and others (e.g., builders, engineers, clients, and "even lawyers"), working drawings are least open to ambiguous or multiple interpretations. They have to be clear, Silvetti argues, because they are not only guides to building but the legal documents that architects use to protect themselves from liability should litigation arise. The emphasis, particularly in the United States, on conventional and legally binding working drawings represents a mediation between architectural practice and the wider society, with the attendant problems in translating from one medium to another. They represent an intrusion of law into architecture.

Society intervenes in architectural practice in at least two ways, both of which limit the possibilities within architecture according to Silvetti. In one case, for many American architects legal liability and the conventional nature of architectural contracts rigidify boundaries between drawings in a way that architects find creatively and practically limiting. For example, most contracts call for payments of 15 percent for the schematic drawings, 20 percent for the development drawings, and 50 percent for the working drawings. This stipulation may force architects to work in ways that are not called for in a given design process—or to work in ways for which they will not be paid.

Contracts and legal processes also intervene by demanding of drawing, or at least of working drawings, a literalness that it may not actually allow. Such a literalness premises a direct one-to-one relationship between various media, which to Silvetti is most probably impossible: **There can't be a one-to-one translation between media. Between words and reality there isn't, between spoken language and the printed word there isn't, and certainly between drawing and the reality of the building there isn't; not even in those documents like working drawings**

is there a one-to-one relationship. There is always something different. He finds that the demand for the literal in working drawings, particularly in the United States, has also devalorized craft by preventing the architect and craftsperson from working from more abstract drawings on site, which would give the craftsperson more creative and active input into the making of the building.

Whatever the problems associated with social interventions into the process of architectural design, personal conceptual sketches are still at the core of architectural practice. For Silvetti, these drawings clarify his ideas and may or may not be presentable. They represent the most private of architectural thoughts within a very personal system of notation: **I do sketch a lot. Everybody has his own way, his own notations for keeping in touch with ideas, for just scribbling and for testing things. Whatever the case, they are not very careful drawings; they are not to show except to people who understand these things. I suppose in the end they are the most expressive drawings and the most pure because they are not politically compromised or meant to produce anything but my own clarifications. So I am only compromising with myself.** In contrast to such personal and investigative sketches are the drawings for presentation to clients and to the public in general. These are the drawings that you use, Silvetti argues, to persuade people that your design is a good one. Such drawings **have really to do with your working drawings and your sketches and sometimes they coincide. Presentation drawings are calculated to show your ideas at their best. This is not an evil thing. When one is convinced that what one has is good, then one has to adjust the representation of what as yet does not exist in some visual format that will be understood and understood at its best.** Presentation in such formats, to Silvetti, is not a cynical move. Rather it is the architect's attempt to get the client or whoever is involved with the design to understand and see it for what it is. Architects do this so that those individuals can best appreciate and participate in the design process.

In attempting to best represent his architectural ideas for clients and others who are not architects, Silvetti believes that the best course is to represent things as closely as possible to the way they will look in reality. Conceptual drawings done by the architect are for the most part too abstract for those who are not trained architecturally. Overly self-conscious "artistic drawings" also misrepresent in their way. To represent their projects for presentation, Machado & Silvetti prefer to use perspectives, especially eye-level perspective.

The choice of perspective Silvetti sees as a controversial one, given the recent attacks on perspective and its use in architecture. In an article written for *Daidalos,*[2] Silvetti defended the use of perspective against various post-structuralist critics who argue that it is a reactionary way to represent space because it is logocentric. Silvetti posits that the argument is wholly ideological and misses the point. Whether perspective in painting was or still is ideologically reactionary, for architects it is a technique that best represents space, particularly for those who are not architects. One knows when looking at perspective that it is not exactly what one will see in reality, but **it is as close as man has ever come to a system of representation in two dimensions that replicates what one is going to see [in actual space].** Silvetti doesn't suggest that perspective is without its ideological implications. All types of drawing, he argues, are ideological. What is more important for the architect is that the various drawing types offer different insights and provide different technical methods for thinking about a design.

Axonometrics, for Silvetti, are very useful for seeing the whole of the project when designing. They allow you to deal with dimensions as you are putting parts together. They also provide a technical device for developing strategies of aggregation and for explaining stereometric intersections. While they give the architect a very useful and analytical view of three dimensions in a two-dimensional form, they are the most abstract of drawing types and as a result the "least real" in terms of seeing actual space.

Plans, while abstract because they don't exist in actuality, are a rational tool for understanding the organization of spaces: **When I do a plan I am really doing a graphic in two dimensions but I am actually seeing the spaces. You have to be an architect to understand. As a layman you understand the plan as a sequence of rooms and relative dimensions and that is part of the plan. But to me the plan also contains some of the basic ideas of a building too. . . . I see the plan three-dimensionally.** Sections and elevations are useful, to Silvetti, for defining the spatial aspects of the building and for determining its relation to the topography of a site and dealing with issues of scale. Facades usually come later in the design process but sometimes will be used in the earliest conceptual phases of a design.

When approaching a design, Silvetti has no particular sequence for drawing: **The design depends on the problem. Some projects are more image-bound than others. Some are so functionally or organizationally complex that you can't go to an image without explaining the relationship of things; e.g., adjacencies, the kind of plan, among others.** Each problem defines the different drawings needed to solve it.

While Silvetti avoids a set strategy for conceptualizing and developing a design, plan and perspective are usually the initial tools he uses: **They tell me more about the ideas. Sometimes I just use a perspective but at other times I can't have an image of the building because I need to understand its organization. Sometimes the functions are so complex one needs to abstract a plan to understand the relative size of things.** To aid him, Silvetti believes that using the notion of building types is most useful:

I support the idea of building typology because I believe that architecture always has to deal with and acknowledge convention. If a building type is suggested, then the type of drawings needed to develop the idea becomes clear: **When a building type seems a logical way to start [a design], then I already have plans and images to begin with.**

Drawing, for Silvetti, is a source for ideas, a tool to direct investigations, and a means to control the overall process of design. But as essential and useful as drawing is, problems are associated with it as well. Silvetti is skeptical about the marketing of drawing for sale. Tempting as such sales are to architects, who often work on projects without compensation, architectural drawings are not the equal of painting or even of artist's drawings. Moreover, such an emphasis on drawing moves architecture away from an emphasis on building and more toward the purely conceptual.

In the development of a more critical and purely conceptual role for drawing, there is a danger that it will come to mislead us about architecture rather than enlighten us. For example, while organizationally correct and possibly beautiful, a purely conceptual drawing can be out of touch with issues of scale and context, with little sense of how comprehensible such a composition might be in space. This raises the specter of a critical practice and a vision of architecture that leave aside the realities of the world and its built form. If used with care, such drawings can be useful in extending our understanding of architecture. Nonetheless, Silvetti believes that as long as there is work for architects, drawing will remain primarily a part of the larger design process that leads to building.

In the everyday activities of his practice, Silvetti and his partner usually produce the initial sketches that contain the ideas that will drive a project. These drawings, while rough, give others in the office enough information to begin more specific investigations based on the initial ideas. **I guess the initial sketches and ideas come from my partner and myself. In firms like ours—we have had some people with us eight years or so—there is a certain language that is held in common; so sometimes I don't need to draw too much. I usually draw the ideas in a very rough state and then we discuss them with new drawings. Then I let the staff explore the ideas; for example, issues of dimensions, proportions, elements to fit the program, square footage, and all those things. I let them sketch these things out with their own sensibilities. Then I go back to really sort things out once I know the initial idea has met some of the criteria and constraints [dealt with by the staff].**

It is a function of time. When I was at the Academy of Rome, for six months I did a project for which I did every single drawing because I had the time. I did all the working drawings and everything. So it is a matter

of the divisions of labor in the profession now that you have to delegate [drawing and design tasks].

If Silvetti argues quite cogently about drawing as an academic writer, we really understand the importance of drawing for him in creating and developing a design when we examine a project—in this case a project that was produced as a set of drawings for exhibition first and then for realization. The project, named the Harbor of Lo Sperone in Palermo, is a commission for the promotion of a development on the seaside at Palermo, Sicily, called the Palermo Esposizione Nazionale di 1991. As part of an international fair, the final drawings, not yet certain to be realized as a building project, became part of an exhibit for public perusal and part of a strategy to persuade the city government to give its permission for the work to be built.

There was, according to Silvetti, very little interaction with the client—a group of entrepreneurs under the auspices of the Christian Democratic Party. They set out as their goals to reconnect Palermo with the sea, and to acknowledge the new dimensions of the city outside its historic center. Nine pavilions were commissioned. Machado & Silvetti was commissioned specifically to design a pavilion for the exhibition of the Arts and Crafts of the Mediterranean and to design a permanent harbor.

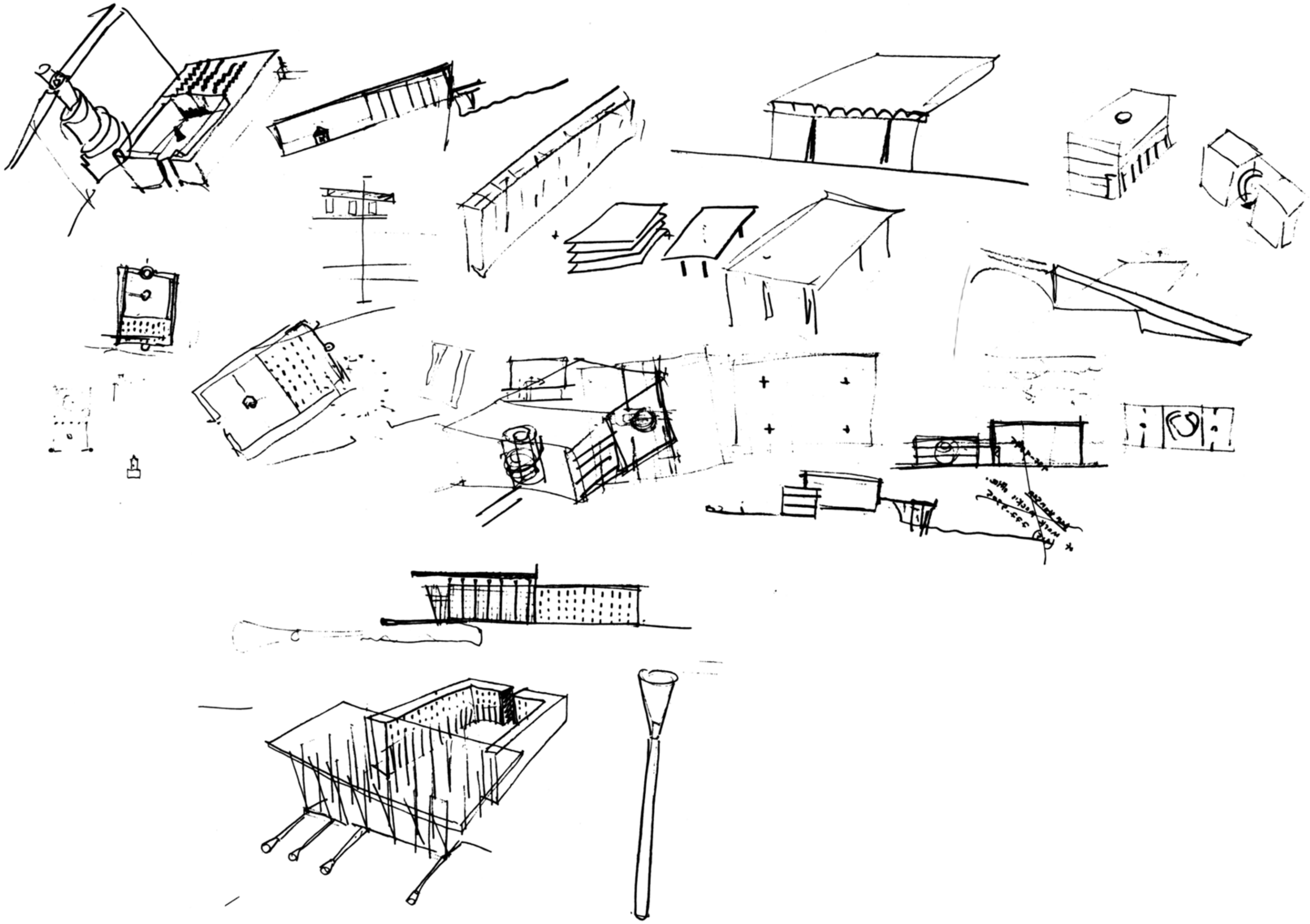
Thematically, Machado & Silvetti aimed the project on the one hand at bringing Palermo back into a Mediterranean nexus by focusing on the sea and, on the other hand, bringing more order to a city that has grown chaotically. On what used to be the outskirts of the city, the site is now part of the fastest-growing area outside Palermo proper. It is a dense low-income working-class area. The site itself is defined by a promontory on which sits a dump so polluted that use of the beach is prohibited.

At the time of the interview, the project was about complete and was about to be sent to Italy for the exhibition.

A figure-ground drawing (figure 34) was made for the first meeting in Palermo to get a reaction from the client about the general planning of the project and to coordinate the breakdown of the site. There was a text attached that set out the argument for reconstructing the shoreline. The drawing was attempting to bring order to a site as a starting point both for discussion and for further investigations of the project's possibilities at a very early stage of conception. Drawn by a junior member of the firm based on a sketch given him by Silvetti, it was eventually considerably transformed.

As the process continued, it was felt necessary first to find an image for the project. The sketches in figure 35 are essentially about the search for an image for the exhibition pavilion, done by Rodolfo Machado for discussion between the partners and the rest of the staff.

Working with this image of the project, a decision was made to bring the water into the building to emphasize



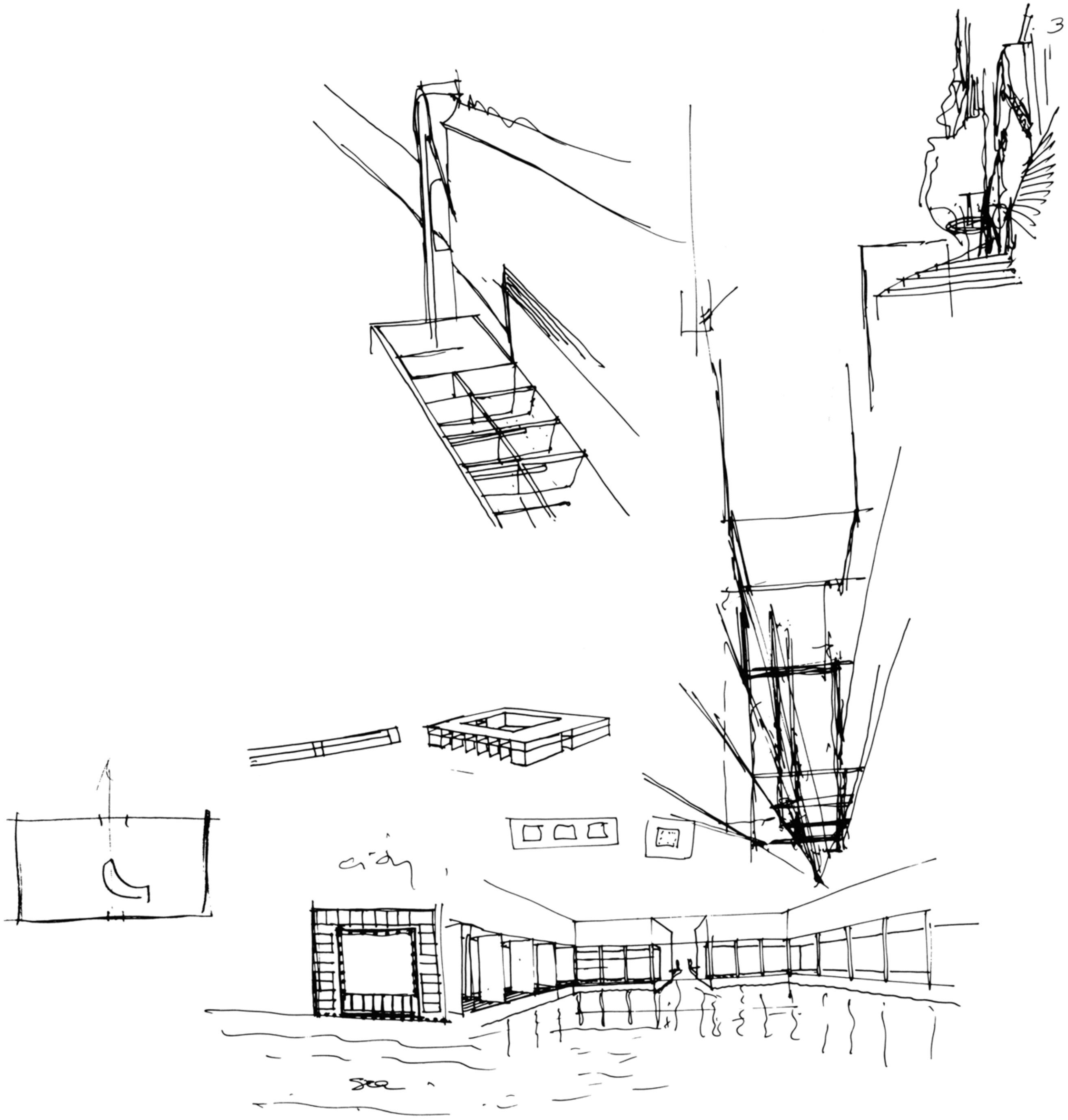
the role of the sea and of water in Palermo. Figure 36, a very early conceptual sketch drawn by Silvetti, was used by all the project members as a point of reference in discussing the design. For Silvetti it is a pivotal drawing conceptually, and it was continually marked and turned during group discussions. The upper right corner of the drawing records the most crucial outcome of those discussions.

In order to understand the images in figure 36 we need to look at figures 37 and 38. The former was actually drawn prior to figure 36: **I [Silvetti] had made a decision about dividing the shore into three parts and making it a large building with two courtyards and covered hall.** This was derived from the image suggested in figure 35: **I went beyond [the ideas] in [figure 35] by locating elements in the site—the garbage dump for example—and started to play with the idea of a harbor and a marina enclosed by a building.** What we see in figures 37 and 38 are two separate but related discourses. One is internal to the drawings themselves; the image of the site seen from the water is by Silvetti (figure 37) while that of the plan is by Machado (figure 38). In a sense the two drawings become not only a record of a dialogue but dialogue itself as each image works with the other to come to a unitary idea. At the same time, the drawings work as an external discourse, referring back to earlier drawings as a critique and a transformation and later becoming a part of further drawings. Additionally the drawings served as a key to the thinking of the other members of the design team, thus becoming an element of the social discourse as well.

By the stage represented by figure 39, a section drawn by Silvetti, what was at stake was the problem of **how to arrive at a general idea of a way to deal with the notion of a gateway to the sea with basic sectional idea.** Done late in the conceptual stage of design, the varying sketches seek out a focus for the internal dialogue among the design team and for Silvetti himself. As a result of the dialogue, the small projective section at the bottom became a crucial image for the sectional strategy during the next phase of development: **When the project team saw it [figure 39], we all laughed, because it is proposing floors below ground. We had established a vertical axis by this time.** The drawing in figure 40 came out of a discussion among the team members. It was drawn by a number of people—Machado, Sam Trimble, an associate in the office, and Silvetti—at a meeting to discuss a plan to make the harbor the center of the exhibition. With the water coming in, the building size can be justified because after the fair it becomes a little pool. The whole discussion, though, revolved around the sectional drawing by Silvetti and was a key element in the early developmental stage of the project.

"A definitive drawing" done by Silvetti, figure 41 was completed after a meeting in which the design team supposed that the harbor was at the heart of the scheme. This is a pivotal drawing because as one of the last conceptual drawings it set out the crucial ideas that would guide the development of the project.

The drawings in figure 42 were done about the same time as those in figure 35 and were done by Machado while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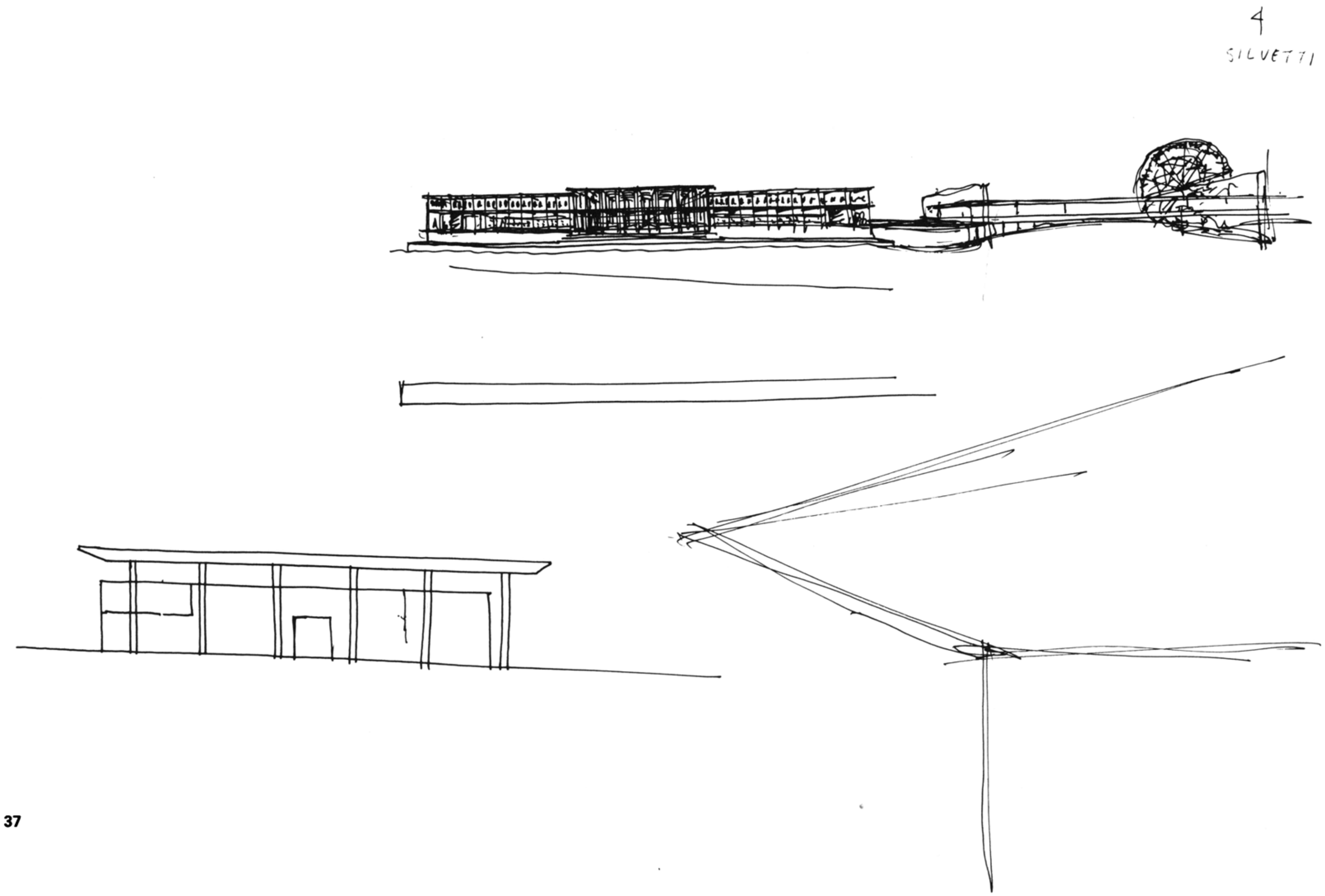

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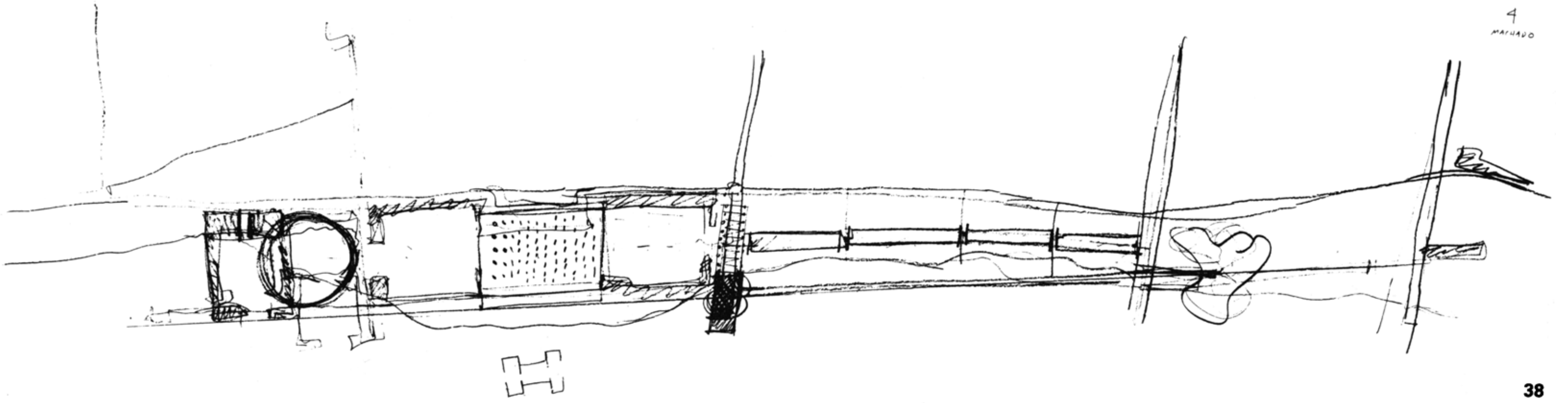

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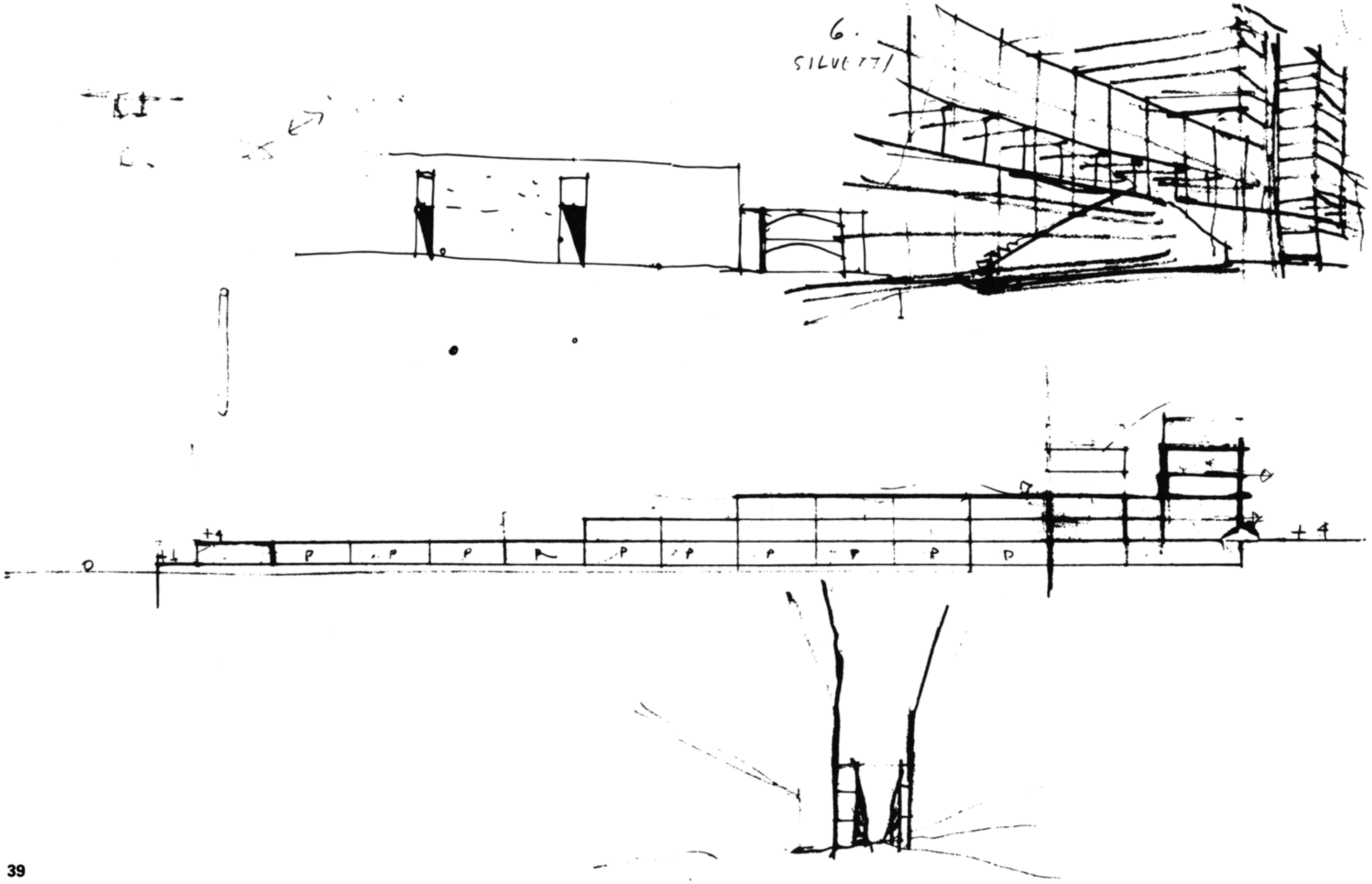

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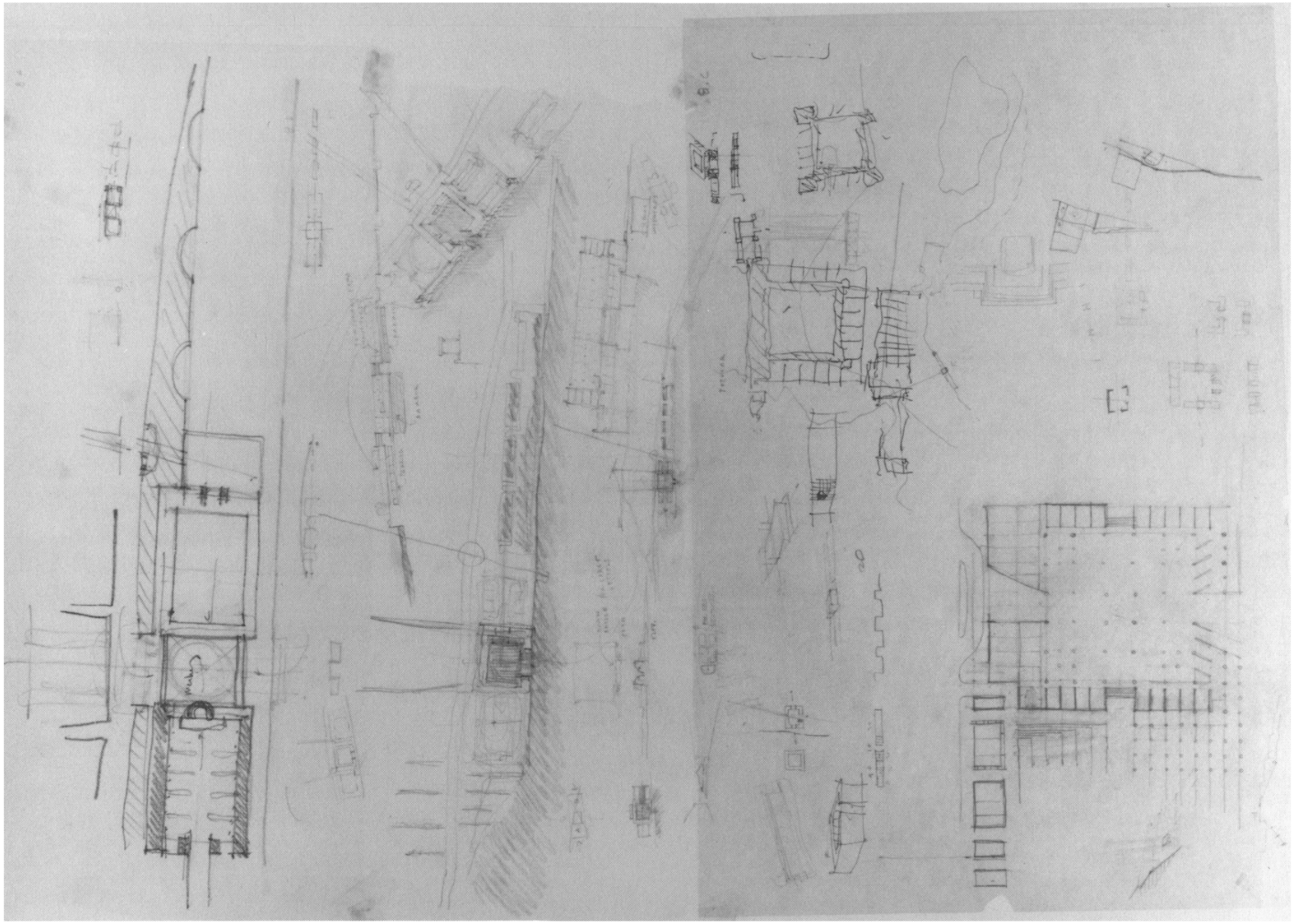

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he was talking to Trimble. Both were talking and drawing, and the result of the discussion was a focus for the 500-meter building, in the upper right corner of the drawing, and the water courtyard, which was eventually put onto the street (see figure 41).

All the drawings discussed so far were part of the ongoing process of conceptual production that eventually led to the development of the design represented in figures 43–46. These drawings, in turn, resulted in the drawings actually sent to the exhibition.

With figure 43 the project is moving from its conceptual stage to that of development. Silvetti felt that there was a need to draw out the terracing in sections at a smaller scale to establish the dimensions necessary for understanding the figure-ground relation. He did this in the drawing by establishing the park grid columns for the temporary structures.

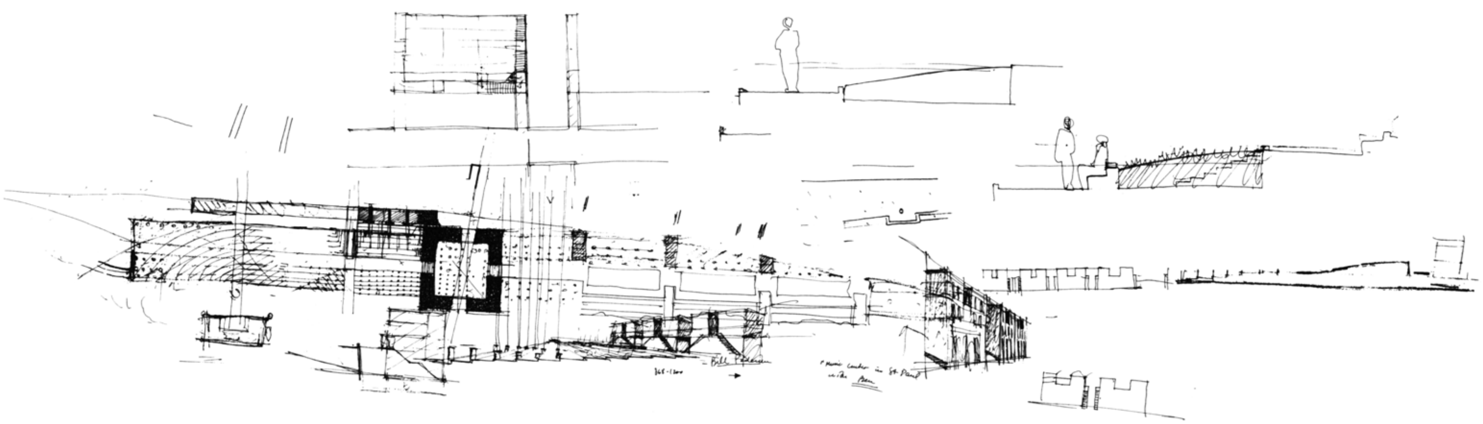
Figure 44 is a drawing of the building itself by Silvetti done during the early development phase of the project to determine the actual dimensions and materials for final realization. What we see here became the basis for a number of underlays that refined the proportions and materials suggested by this drawing.

By the time that figure 45 was completed by Silvetti, the project was well on its way to a more refined stage. It was drawn to sketch out the idea for a canopy to be placed over the harbor during the fair. The drawing is an attempt to understand how to work out the design, in which some elements are in tension—the tent—and some are not—the columns. The columns would remain after the fair and could be used as part of the port.

Figure 46 consists of a series of drawings done late in the development stage by a number of members of the design team. Each examines and develops some specific piece of the project. For example, what we see labeled as 15a looks at the axis through the building, while 15b is a projective section and elevation drawn together to derive the relation of temporary to permanent elements in the scheme. The lower part of the drawing, 15c, looks at the issue of permanent and temporary elements within the building itself.

All of the drawings were produced in order to derive the final product of drawings to be sent to the exhibition (figure 47). Because Machado & Silvetti is a small firm, these drawings were done by all the members of the project team (Sam Trimble and Omer Erduran as well as Machado and Silvetti), not by specialists in presentation drawings as is the case in some larger firms. Of these drawings, some represent thinking from earlier stages to give the viewer at the exhibition a sense of the process of design, as part of a larger strategy of persuasion.

Drawing, for Silvetti, sets out the very essence of his office's practice. Drawing serves as part of a larger social practice within the firm, setting out the ideas, the social relations, and the intellectual and conceptual processes that will finally determine what the firm does and what it represents both in its production and its mode of practice.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Music Center in St. Paul
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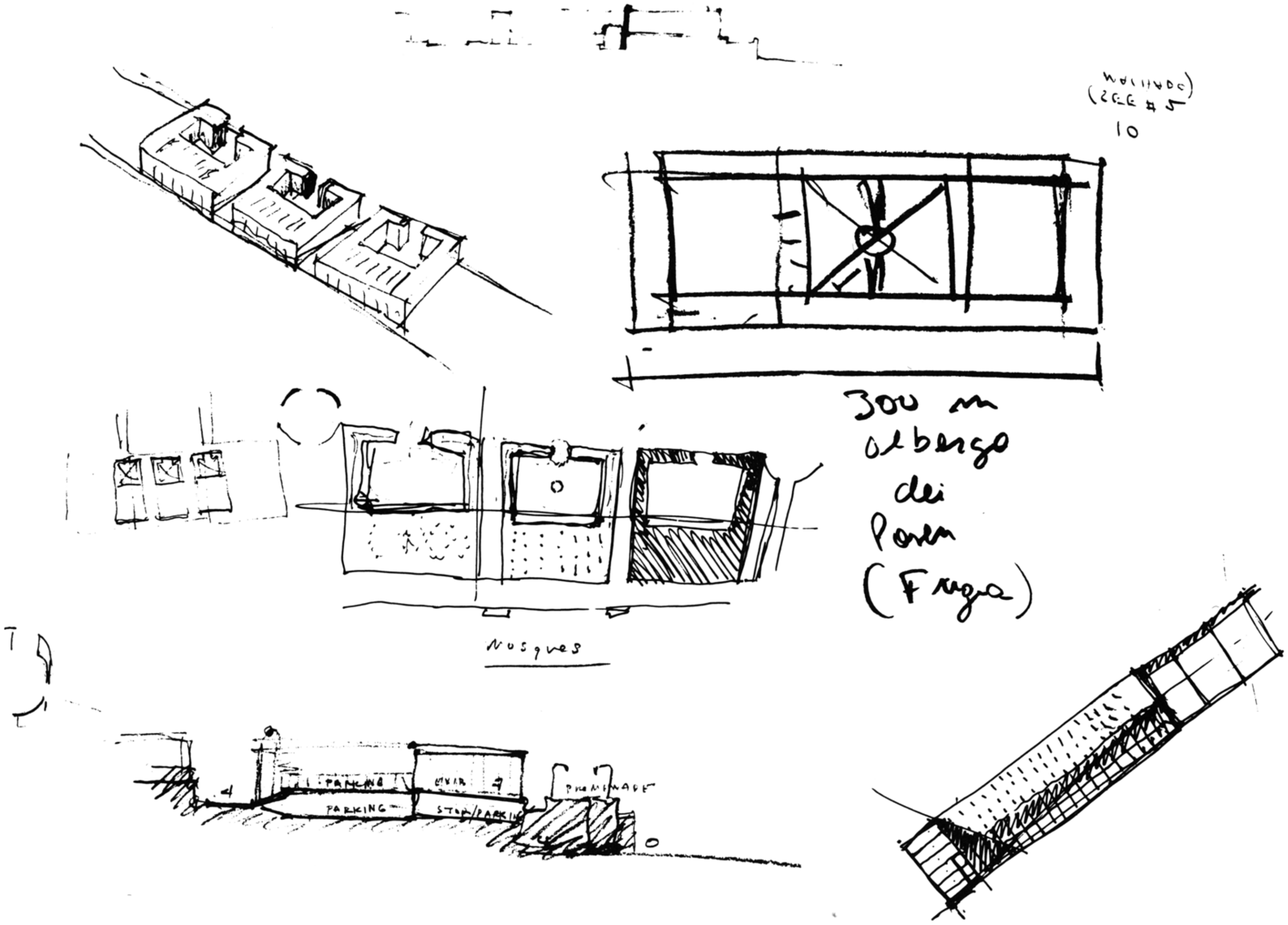
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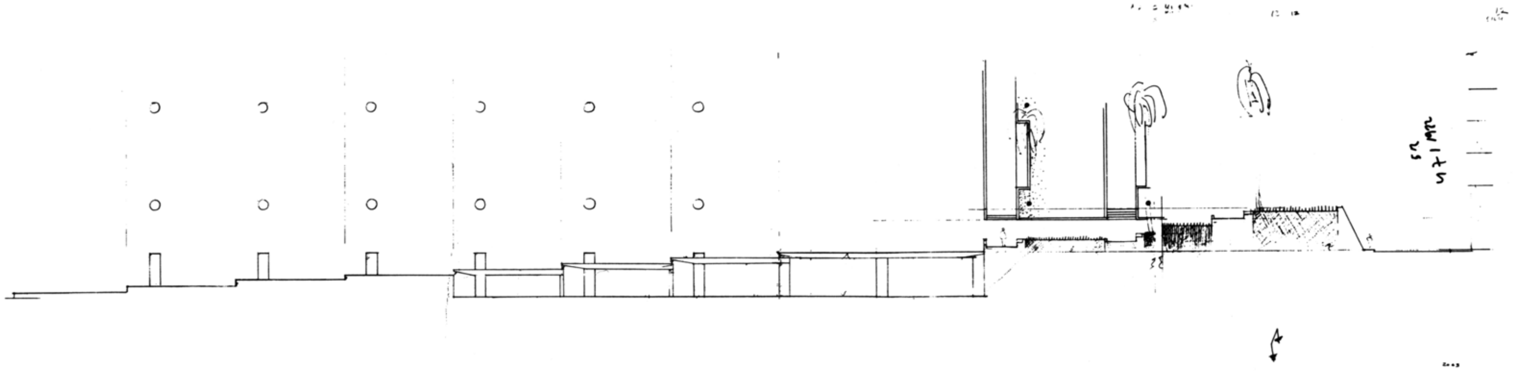

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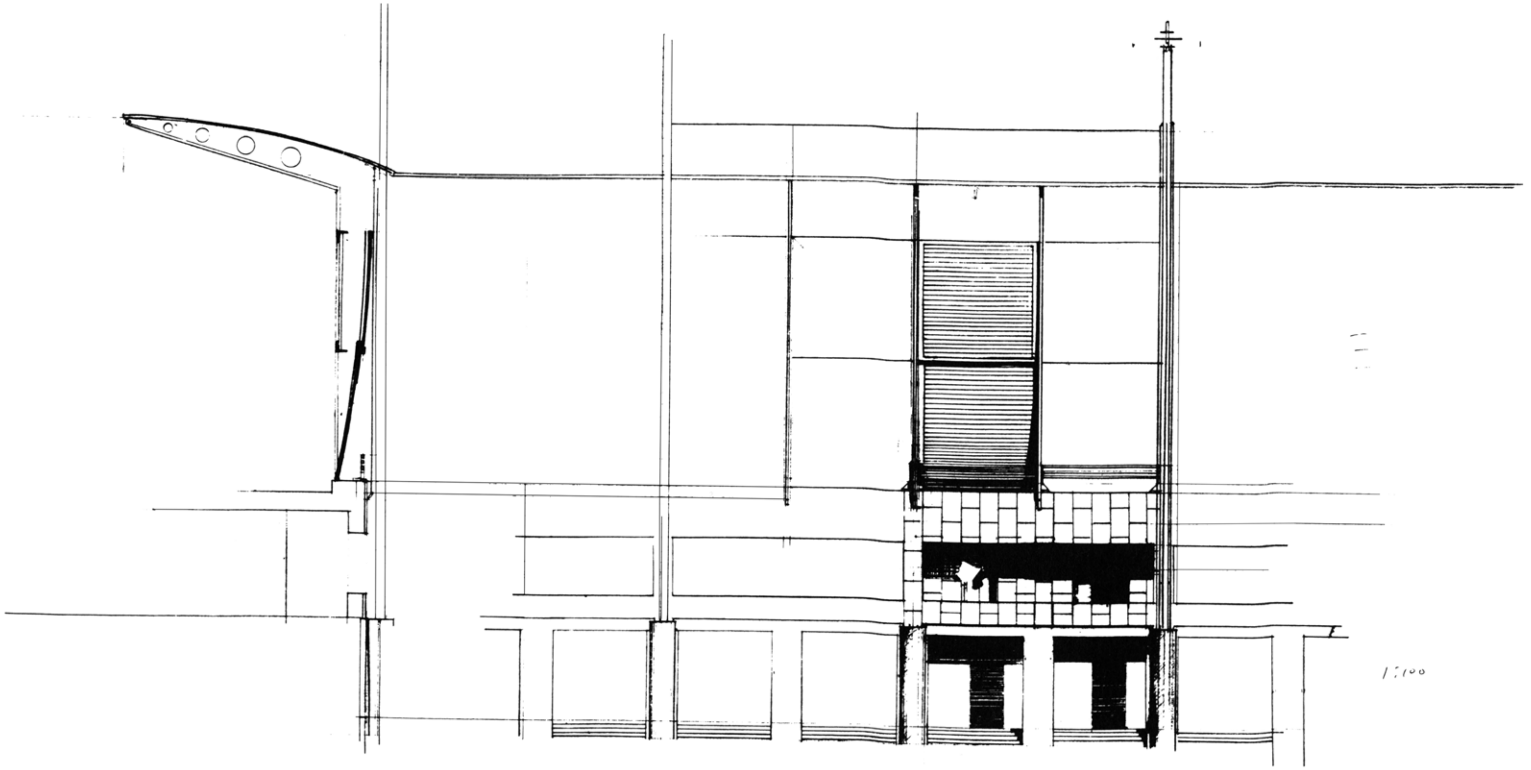

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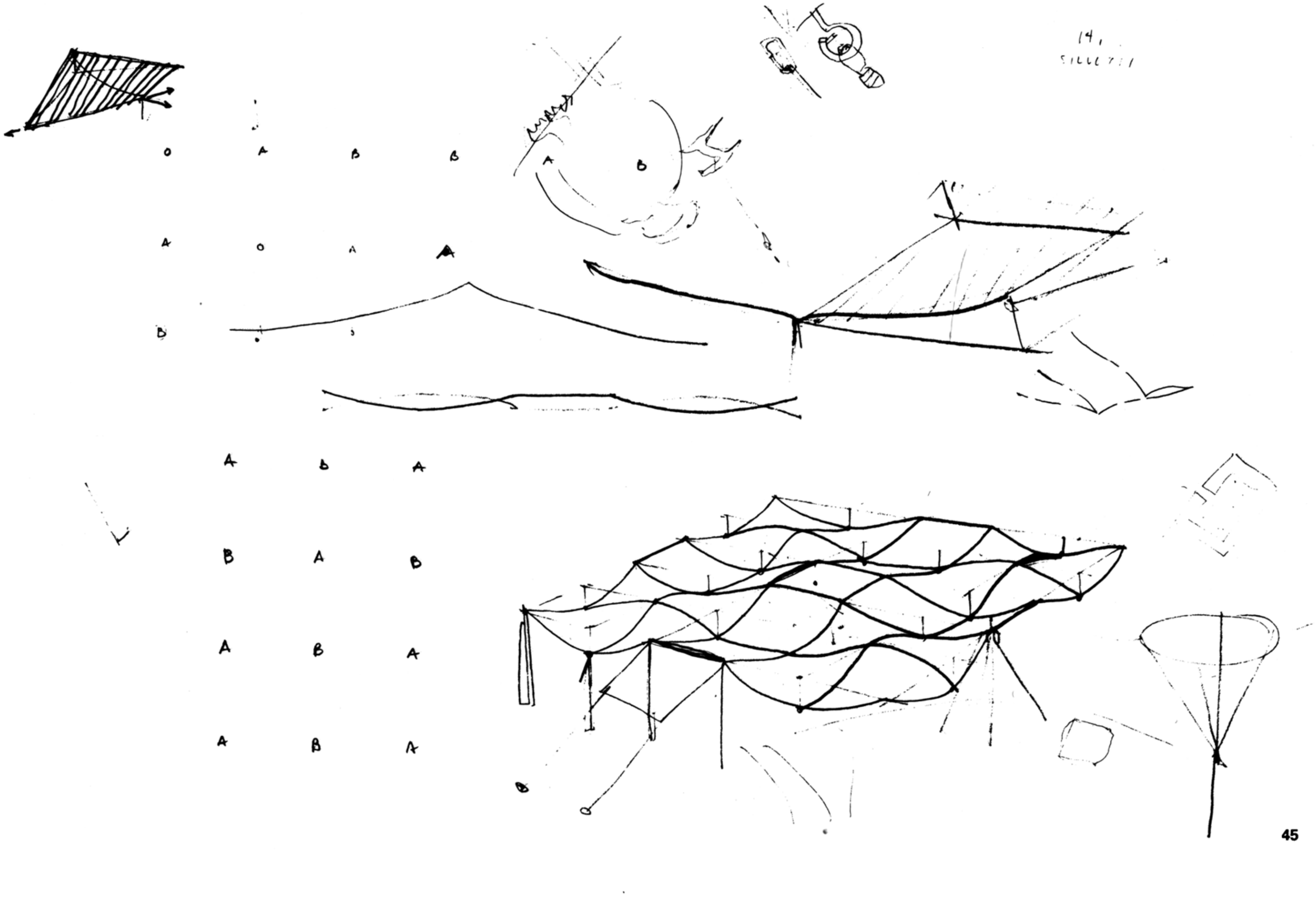

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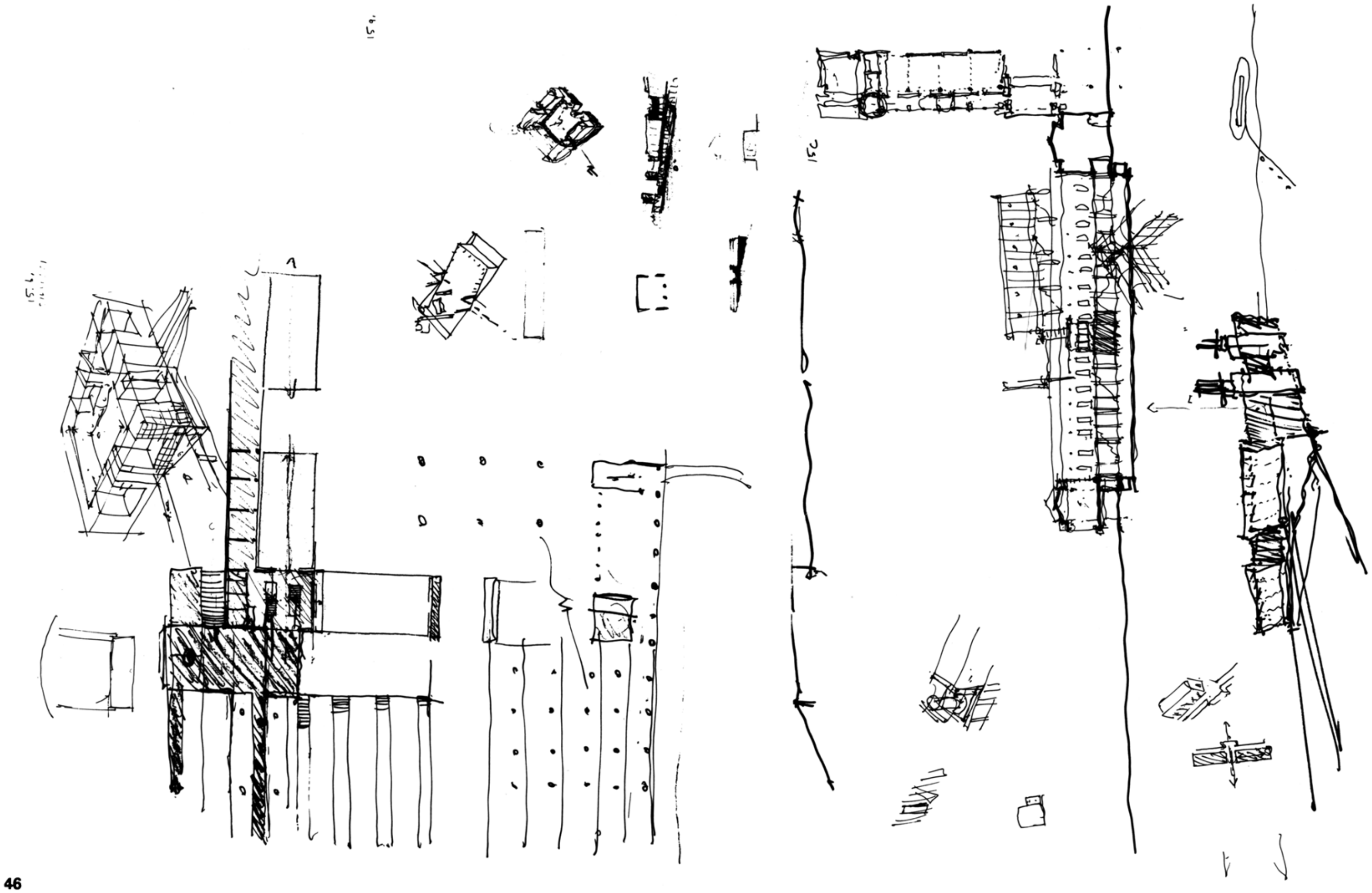
Jorge Silvetti *Machado & Silvetti Associates*



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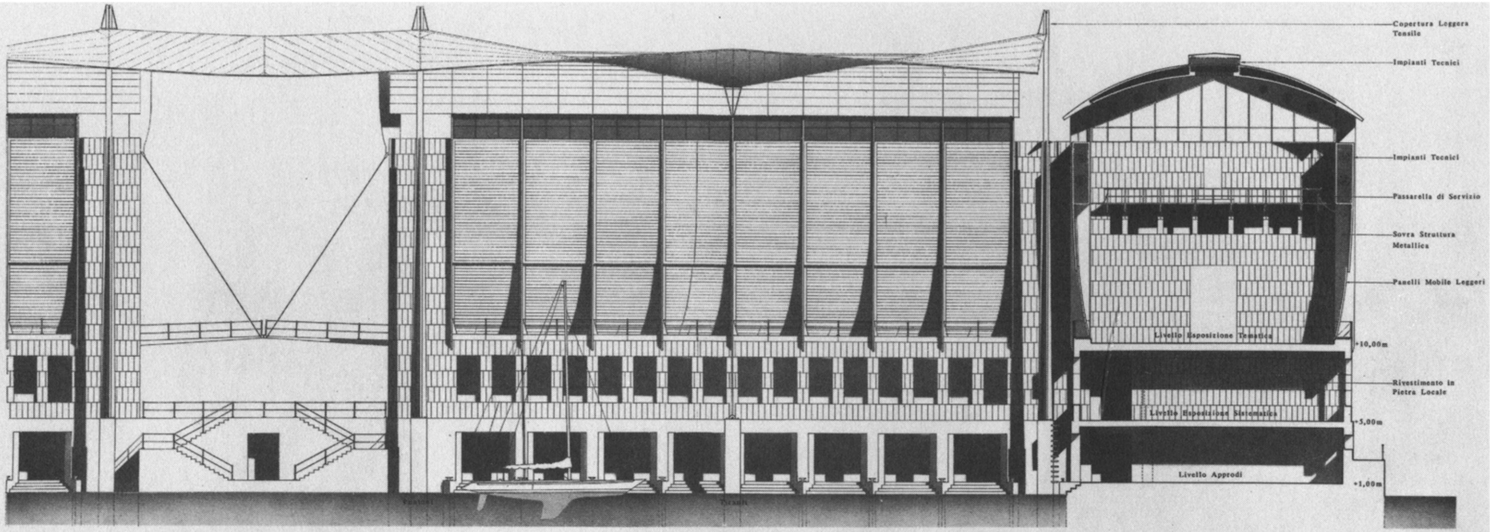
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Sovra Struttura Metallica
Panelli Mobile Leggeri
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+10,00m
Rivestimento in Pietra Locale
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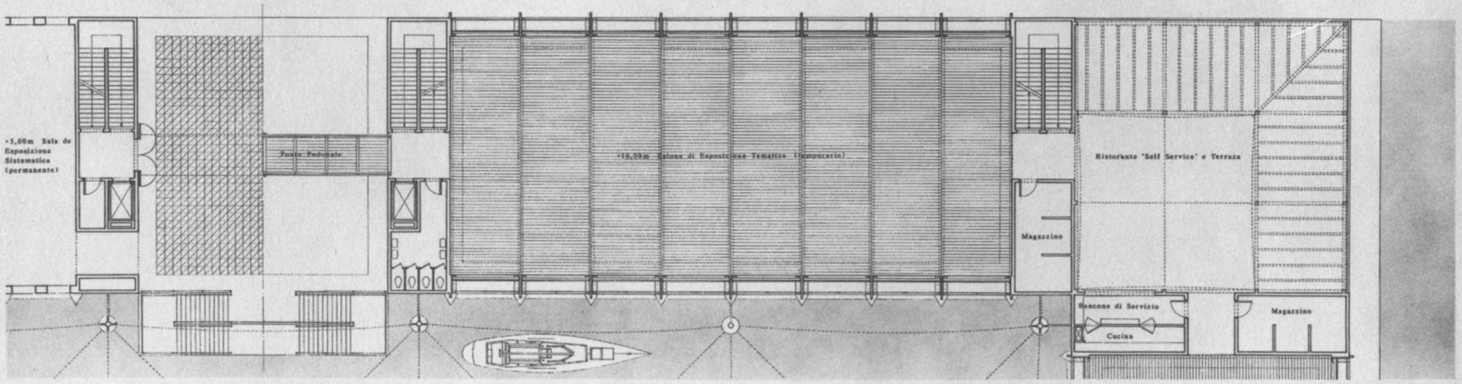
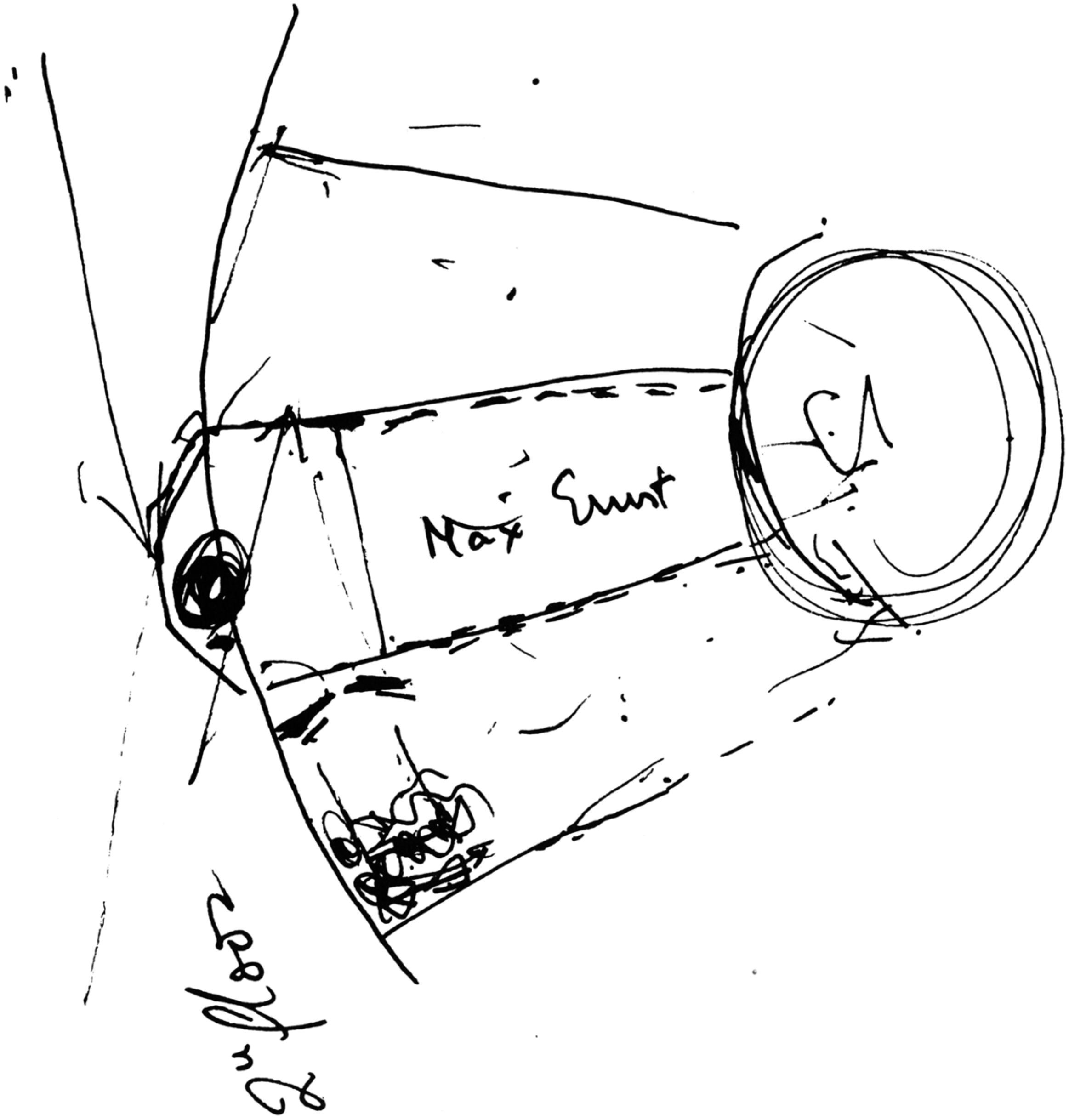
Prospetto e Sezione Parziale


+5,00m Sala de Esposizione Sistematica (permanente)
Ponte Pedonale
+10,00m Salone di Esposizione Tematica (temporario)
Magazzino
Ristorante "Self Service" e Terraza
Bancone di Servizio
Cucina
Magazzino

PALERMO ESPOSIZIONE NAZIONALE 1991 "Le Attivita' Umane nel Mediterraneo"

APPRODO DELLO SPERONE – PADIGLIONE PER L'ARTIGIANATO


Max Ernst
2n Floor

Renzo Piano's firm, the Building Workshop, with about a hundred people working in Genoa and Paris, is world-renowned for its many projects and for its attention to the craft of architecture. Piano's understanding of how and when drawings should be used derives from his sense of the relation of design in the abstract to the making of a building: **Drawing is one of the moments of the theoretical process of architecture. It is a concrete process. You start by sketching, then you do a drawing, then you make a model, and then you go to reality—you go to the site—and then you go back to drawing. You build up a kind of circularity between drawing and making and then back again.**

This is very typical of the craftsman's approach. You think and you do at the same time. You draw and you make. And I find it quite interesting that drawing as a pure instrument of a circular process between thinking and doing, drawing is in the middle but it is revisited. You do it, you redo it, and you redo it again.

Although Piano places great emphasis on drawing, he, like the craftsman he alludes to, is not content to trust in drawing alone. At the beginning of my interview he asked whether I had visited his model shop, a complete shop for working not with soft wood or cardboard, as is usually the case in architectural offices, but with all the materials that would be used in actual construction. Models to Piano are not merely representations for presentation, nor are they for specific tasks like studying massing; rather they are full-scale tests for all the parts of a design. He employs two traditionally trained skilled craftsmen full time to work on models: **We often mix models and drawing. But the model, as you can tell from the workshop, is not actually a representation like drawing. It is not a wedding cake you bring to the client. It is more than that. It is the physical translation of the drawing into something three-dimensional. After the model you return to drawing.** Piano uses various media in design, although drawing remains the critical medium, because he feels that the drawing is never perfect. He trusts in what he calls "the imperfection of drawing," in opposition to those who speak of drawing as defining an internal dialogue that works without any recourse to other media or reality as a test of its validity.

Process is crucial to Piano. A process that he has used over the years involves a lot of testing of the drawing on site and with models: **This implies a lack of efficiency in the office in the sense that we are not the kind of office that does the drawing and it's finished. When I talk about the lack of efficiency, I am not so suicidal that my work does not proceed. What I am saying is that I don't believe in the perfect efficiency of the drawing, sending it to the builder and being done. I don't believe in that sort of perfection. It is fake and it doesn't exist except when you do conventional architecture where because something is done all the time the builder and architect**

can be lazy. While Piano believes in a process of testing and retesting, drawing still remains the central mode of architectural conception and communication. At the beginning of each project, he thinks about it and records his thoughts on a piece of paper often folded into four parts so that he can fit it into his shirt pocket (see figure 53). It forms a kind of shorthand with images and words: **I do sketches like that which are midway between writing and sketching. It is a way to remind myself of a certain element of space or a detail. I move very often from a general statement on the relationship of a building to land etc., to small details about a piece. So what we get is nuts and bolts but also a general concept. These sketches are a way of revisiting the idea by working with the mind and the sketch all the time.** The preliminary sketches produced by Piano become the basis for the work of his partners and assistants. The members of the design team reproduce the ideas suggested by the preliminary sketches and transform them into "real drawings." These then become the stuff for further investigation and transformation.

Piano himself rarely draws at a scale larger than sketches but spends his time sitting with all the various members of the design team working out the details represented by any given drawing or set of drawings. Often the drawings are placed on a wall for analysis. At these occasions, sketches are often added to the original drawings for clarification and further investigation and refinement. **That is what I call the imperfection of the drawing. As an instrument, at the same moment that you finish it [the drawing], you start again. It is not an endless process because at a certain moment you stop, but what you get is an accumulation and reaction on the same piece of paper.** For Piano, drawing is a crucial part of the process of understanding a design. It is a process of thought without which the architect cannot understand what it is he is making: **Unless you draw something, you do not understand it. It is a mistake to believe that now I understand the problem and now I draw it. Rather, right at the time you draw you realize what the problem is and then you can rethink it.** That is why Piano refuses to delegate drawings outside the office. The design team, if it delegated drawing to someone else, would lose the principle instrument of its creativity: **Designing and making is like having a quiet sort of game and that game is played through drawing.** Given the importance of drawing in the creative enterprise of design, Piano emphasizes the great number of drawings necessary for the conception and development of a project. For the DeMenil Museum, he estimates his office did over 1,500 drawings, and for Beaubourg (the Pompidou Center in Paris) the office did over 10,000. It may be a lot of drawing, but not to undertake such a task would, for Piano, be a big mistake.

As Piano works internationally, projects are often undertaken as joint ventures with other firms. When working with other firms in partnership, the organization of the design team will vary from situation to situation. Whatever the situation, however, Piano's office does most of the conceptual and development drawings itself. In the case of the DeMenil Museum, because the venture is a joint one some drawings were done in Piano's office while others were done under the direction of members of Piano's firm in the office of the joint partner. If the job is simple, less constant communication and overseeing are needed, but if it is complex, all the drawings down to the minutest detail are done by Piano's office team.

Given the nature of Piano's practice and his emphasis on the craft element in architecture, he feels that it is necessary to involve the engineer at the very beginning of a project. He has collaborated with the same engineers and engineering firm, Peter Rice, before his untimely death, and Tom Barker of Ove Arup & Partners of London, for 20 years; drawing has become a critical component of the communication between engineer and architect: **There again the way we mix drawings of engineers with the drawings of the architects is very complex. We have sort of a flow coming and going from the architect to the engineer and back again. This is also in a sense an imperfect process in the sense that we never send a finished drawing to the engineer and they never send a finished drawing to us.** Piano differentiates this aspect of his practice from more conventional firms where one finishes the conceptual part of a project and then involves the engineer during development. His procedure means that the firm does rather more drawings than is typical of architectural firms, but for him this is an essential part of the process of experimentation that finally results in a finished design. The process, while appearing inefficient, is very efficient to Piano: **Our efficiency implies the complexity of doing and doing again. Galileo Galilei said something like *provandi e riprovandi,* which means trying and trying again. It is sort of a basic philosophy of experimental work. And the way to get out of trouble is doing that.**

Testing implies drawing as a central part of the process, but it implies other instruments as well. Models are also a critical aspect of design thought for Piano, but the models he uses are not presentation models. They are to-scale models of part of the design: **When I speak of the model, I would rather use the word test because the model is a test. Otherwise when you mention a model you think of presentations.** The third instrument in Piano's kit of architectural tools is the mathematical model. **Nowadays it is perfectly possible to simulate the solution to a problem by mathematical systems. For example, when we did the design for an experimental car for Fiat, we approached the solution by two parallel systems. One was theoretical—the mathematical, through computer simulation—and the other was physical—the real test; torsion tests, crash tests.** In all of this, though, the drawing remains the linchpin, the mediating instrument among the other forms of testing and experimentation: **The drawing is something in between all this. For that sort of approach the drawing follows the testing of the other system (e.g., torsion tests, etc.) and becomes also a bit experimental.** All the testing and all the drawing for Piano are efficient in the good sense of the word. It is a process that aims for more and more precision, and when the precision is finally there, in Piano's word, "boom," one has the design.

Piano has very definite ideas about what drawings are best for what purposes and results. What he trusts about drawing derives from what he feels each type of drawing implies. When asked about specific types, especially perspectives, he was quite emphatic: **We never do perspectives. I hate making perspectives. Making perspectives and wedding cake models is to me completely inadequate to express architecture. It is a way to capture the magic architecture in something you can understand fully, totally. And that is fake, not true. It is a kind of mystification of something [architecture] that is by nature wild.** There are things in architecture, Piano feels, that cannot be caught in an artistically rendered perspective. The light in the DeMenil Museum is an example. While he does these rendered perspectives for clients once in a while when they request them, perspectives are not drawings he prefers to present.

But if artistic perspectives are not Piano's idea of a useful and meaningful drawing, the sketch perspective is another matter: **That is something we do quite a lot. That is something we do for our thought.** Piano's attitude toward axonometrics parallels that toward perspectives. He uses axonometrics for sketching in order to think about problems: **But I don't trust them too much. It is a matter of habit. I came to architecture from a completely different direction than most architects. I came to architecture from building, from construction; the practical side. So I dislike a bit the fancy instruments of representation. I am not saying it is a bad way to work, but it is just not mine.** Drawing axonometrics after the fact to illustrate the design or to use for public presentation, as many architects do today, is rejected by Piano. Unlike those who see the drawing as the purest representation of architecture, Piano delights in the small serendipities that buildings present after the design: **I have a kind of pleasure in the surprise result that architecture gives. I don't pretend to understand fully the final space [until it is built]. I believe that space in architecture is a result of those elements that you can't draw, like light. I like the surprise. It is a kind of ritual respect.** Surprise comes in building, Piano believes, because the translation from drawing into architectural object is never exact. The drawing helps the imagination and gives the architect a particular form of design knowledge, but the architectural space is not complete until it is built, and the built space is not a compromised version of the drawing: **You know architecture when it is in your mind and when making the sketch and the design, and the drawing helps this. But you have a big jump to the next step when the architecture is made, and that is the surprise, when it is finished.** Whatever the limits of drawings, as noted earlier Piano believes in doing a lot of them. To conceptualize and develop a project as well as realize it, Piano and his office use the usual kit of drawings that others do (e.g., elevations, plans, and sections), but with a difference. The attitude taken is that drawings are useful as instruments of command over the process of design and not as ends in themselves or as complete expressions of building.

Elevations, plans, sections, and working drawings are the stuff of the design development. All these drawings are instruments that, for Piano, coordinate everything that will be built, but with limitations: **We do a lot of those drawings as a reference. Then we blow up parts. It's like an index to a book. Then again like in making perspective, I don't believe in the big elevation as a way to express the building fully.** Like many architects, he finds plans particularly important for defining and getting a sense of space. But as with all types of drawing, Piano sees them as limiting and necessitating other systems of investigation: **[Plans] are something that help me a lot, but to me there are other systems that help a lot too. One is totally material; that is to create references in the mind. For example, you think about a street in the scheme. Then you start over the next few months to look around you as you move through a new town. I do it quite a lot when I am thinking about a design, I find references everywhere that help me define the scale or size of the scheme.**

I know well that one of biggest mistakes architects make is that of scale. And that is something you never draw or make in a model. The only way to understand scale is by using a real reference. You think and you look and, for example, you find a small piazza and you see that it is 32 meters square and that is good for that kind of piazza at the scale you are thinking about. Even if it is a piazza from the fifteenth century, it is still a good reference.

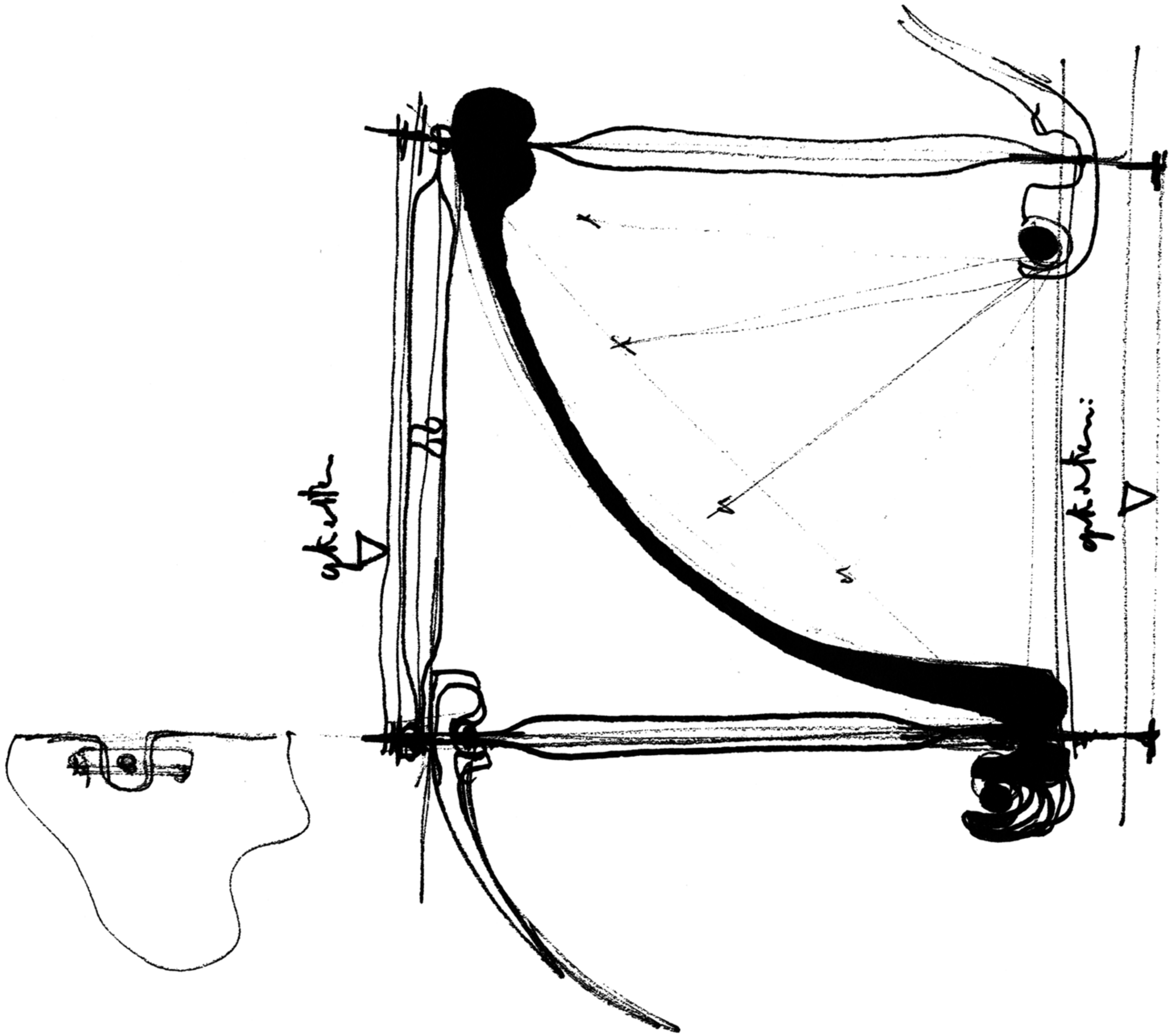
Generally when Piano works on a design, he begins with sketches and drawings of the elements of a project, then does a general plan and returns again to the details of the project. This process is repeated many times within the office and with the engineers and builders. For Piano, it is important that the engineers participate in the project from early in the conceptual process and that builders, particularly the main contractor, participate from early in the process of design development: **I dislike the idea of making all the scheme and then going to the contractor. I come from a family of contractors and believe they can make important and creative inputs and experience. So I like the idea of mixing architect, specialist, engineer, and**

contractor before coming to the end of the scheme. Along with getting early outside inputs, Piano begins drawing details from the very start of conception. These drawings are often not at all abstract but are specific to a particular part of the building: **We never go from the general to the detail when we do drawing. Very early we start to draw the detail. To me that is an important thing. You don't make the scheme just by solving for the conception and the big problem and then sometime later dealing with the small problem, because the detail and the small problem are part of the conception as well. For example, the discussion of what material to use comes very early in our process. In the DeMenil collection, the philosophical idea of the treasure house [figure 48] with all the works of art and the exhibition area lighted by natural lighting came at the same time as we started to draw the leaf for the roof. At the same time we decided on ferro-cement for the leaf [figure 49]. . . . The urban design, the philosophy, the architecture, and the detail go together.** In a sense, for Piano there is no distinction between conception and development in his process of design; they go on in parallel.

After the first conceptual sketches are done by Piano, his associates begin drawing to expand and develop the ideas initially presented by him. There are according to Piano no particular distinctions among the associates about who is to draw conceptually and who is to do other drawings: **I don't believe in the separation between conceptual work, craftsman's work, and execution work. As I said, everything comes together.** While there are no general distinctions about who does what in the firm, not everyone is responsible for all the activities in the process of design. If this were the case it would create, in a word, "confusion." But Piano argues that the separations in his firm are not hierarchical, in order to get the best out of all the members of the design team.

For Piano, the separation of tasks between those who do conceptual drawings and those who do working drawings is in theory not important, because the working drawing is as critical to the design process as any other drawing. It is not merely a result but is a critical part of the process of control over the final product. His working drawings, he argues, are extremely detailed because in his architecture **quality is very much related to the precision of the detail—not perfection but precision.** Working drawings are critical also because they diminish the possibility of choice: **I dislike the idea of leaving something to choice. I like the idea of keeping in mind all the details. Our working drawings are very detailed. We actually count nuts and bolts for the construction of each piece. The building is very much dependent on the detail; the organicity of the building comes from that.**

It is not perfection. As I said before, I dislike perfection. It is that I believe that the real beauty of a build-



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ing comes from the natural details. It is not the detail in the sense of a glossy finish. What I am talking about is something quite frugal.

If you go to Japan, you realize the quality of the building is made from very small and subtle things. The nature of the joint between one piece of wood and another.

And if you understand architecture, it is in the detail. The articulation of material with material, joint with joint. Articulations are a matter of detail. If you do not draw that detail precisely, you lose the opportunity for bringing quality to work. But if drawing is key to this process, there are limits to its capacity to translate precisely into three dimensions. That is why for Piano the model to scale and the on-site test are also important. **I don't think the drawing is enough to transmit or transfer all the control you have into the building.**

I don't believe in the theoretical approach where you find the solution in your mind. Early in the scheme it is the drawing, or the model. In the second stage it is the test on site. But however important models and on-site tests are, they rely on the precision and control wrought through drawing.

The drawing is also critical in defining a proper relationship between the client and the architect. It is important to Piano to show clients the process of design in order to properly involve them in the process as well: **With clients—for example we have people coming tomorrow—we do not show a fancy model or fancy drawing. We actually show the process. That is quite important because people understand better. I am not saying we are suicidal. We don't show things that are wrong.**

It's a question of dialogue. You need to build up a dialogue. If you only show a reduced solution as if built and finished, you lose an opportunity for communicating with the client. It is about participation not only when you deal with a housing project but when you deal with someone like Mrs. DeMenil. Sometimes it can be dangerous though to show everything, but if the client is a good one then I think transparency is best.

With visiting architects, Piano feels he can be totally open with his drawings because, he says, he "welcomes criticism." Without criticism, you end up mystifying yourself. When doing competitions, though, Piano, who doesn't enter many, believes it is necessary to do special kinds of drawing. Because they are judged quickly, competitions demand drawings that are more emphatic, more expressive, and more diagrammatic. Even here, though, he emphasizes detail.

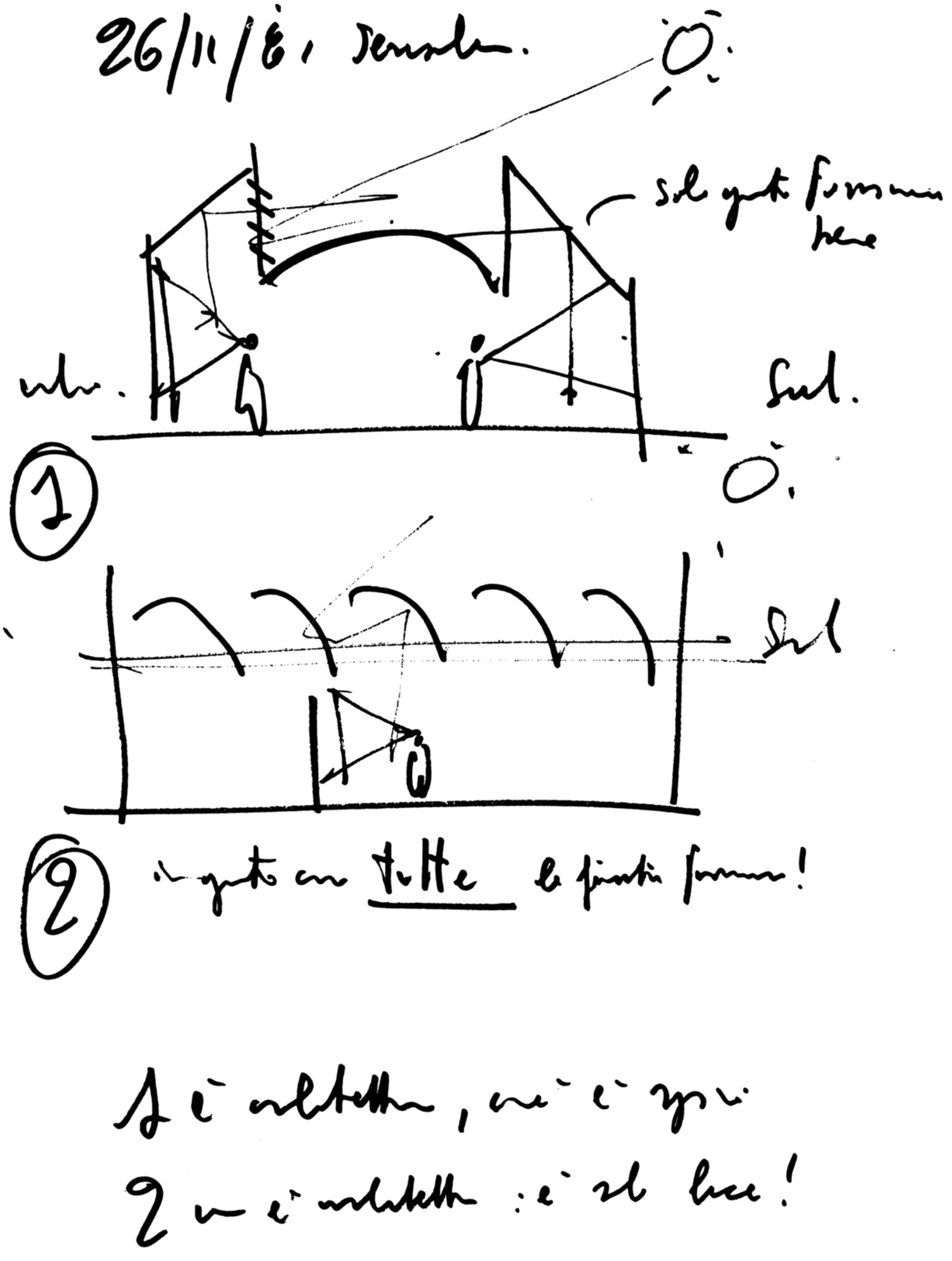
Finally Piano puts great store in communicating with the public, particularly in situations where urban design or public buildings are at stake: **For example, one year ago we started a project for the rehabilitation of Palladio's basilica in Vicenza. We decided that the scheme was**

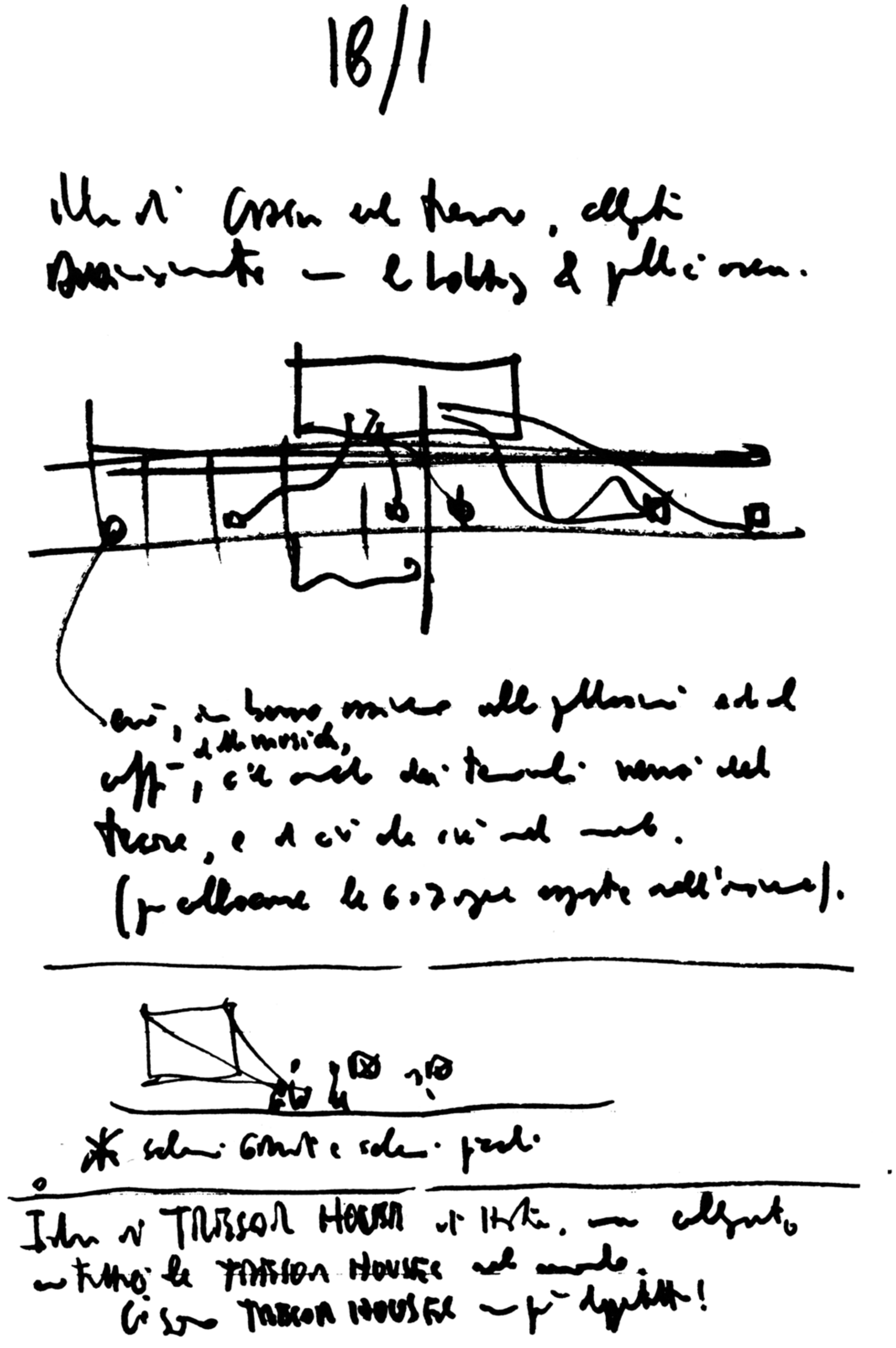
too public to be kept in the office. So we put it on display for immediate discussion with the public. It was both a disaster and an interesting process. It brings you to a kind of humility, but it is best when you are not totally free to design.

It is actually the opposite. The more restrained you are, the more creative and disciplined you become. But this process of public display and discussion, a process Piano's office is using for a UNESCO project in southern Italy based on the idea of a traveling workshop, does not mean that he believes you can show all your drawings to the public without reserve. Rather, Piano believes that there are things the public cannot understand and that if you display those things you can mystify the public. **You have to be careful. If you show the wrong drawing you mystify your role, like when a doctor or lawyer uses too difficult a language. People become intimidated by that. Drawing can be used as a form of intimidation. You need to discuss only things that are understandable. You can't for example show too technical a drawing.** For Piano, drawing is like talking: **Some architects talk in a difficult language that nobody understands. It is, again, a kind of intimidation that helps keep the architect in the golden cage. But you can draw as you can talk: straight and simple. You'll be understood.** In the end, drawing for Piano is an essential for architectural thought, understanding, and communication. It is the mediating instrument between mind and hand, abstract thought and reality. But unlike other architects, he does not think of it as architecture or the purest form that architecture can take. Architecture in the end resides not in the hand of the architect but in the building that he builds. Drawing is an instrument through which the process of design is carried out and through which the architect conducts himself and others in the final production called architecture.

The DeMenil Museum in Houston, Texas, has been an important and critical success for Piano. His first work in the United States and done jointly with Fitzgerald Associates in Houston, the design (as Piano pointed out above) was based on the details of the roof system and on the initial idea for the museum as a treasure house of the client, Mrs. Dominique DeMenil (figure 48).

One of the first drawings done for the project by Piano was sketched on a trip the client and Piano made to Israel to see a museum there. He used this sketch (figure 50) to explain to the client the idea for the roof structure and illustrate how it would allow natural lighting. The leaf structure made of ferro-cement, suggested very early in the project (figure 49), would become for Piano the key to the design of the museum. The top sketch in figure 50 is of the Kibbutz Museum in Israel while the bottom one is of the roof structure for the DeMenil. Eventually the sketch was used not only by the client but by the design team as well to work out the ideas for the scheme.


26/11/81, [illegible].
sole quanto fornisce bene
nord.
sud.
1
sud
2
in quanto con tutte le finestre formano!
1 è architettura, ma è spazio
2 non è architettura: è la luce!



18/1

Idea di Cavea nel terreno, collegati
[illegible] — e lobby & pubblici [illegible].

così, in basso, [illegible] alle gallerie [illegible]
uffici, della musica, c'è anche dai terminali verso del
teatro, e di cui [illegible].
(per [illegible] le 6 o 7 [illegible] all'[illegible]).

* [illegible] Granite e [illegible]

Idea di TRESOR HOUSE [illegible]. — [illegible]
— [illegible] le TRESOR HOUSES nel mondo.
Ci sono TRESOR HOUSES — [illegible]!

Another sketch by Piano (figure 51) was done in Houston. Piano was thinking about the idea of the treasure house and galleries suggested initially by the client when Piano and she had visited Israel. The sketch done for the client had been given to the design team to see how it would work out. Eventually the sketch in figure 51 was given to the design team as a memorandum from Piano for them to work on and to the client for her input.

Figure 52 is also from early in the design process and was produced jointly by Shunji Ishida, who drew the frame in the drawing, and Piano, who sketched around it. The drawing was produced to show how an element that is part of the structure would also serve as a source of light. It was also intended to show how the roof element is a synthetic of several elements and how it would provide support for the artificial lighting for the galleries. Produced for a report to the client, it was used more by the design team both in Italy and in Houston and by the engineers on the project.

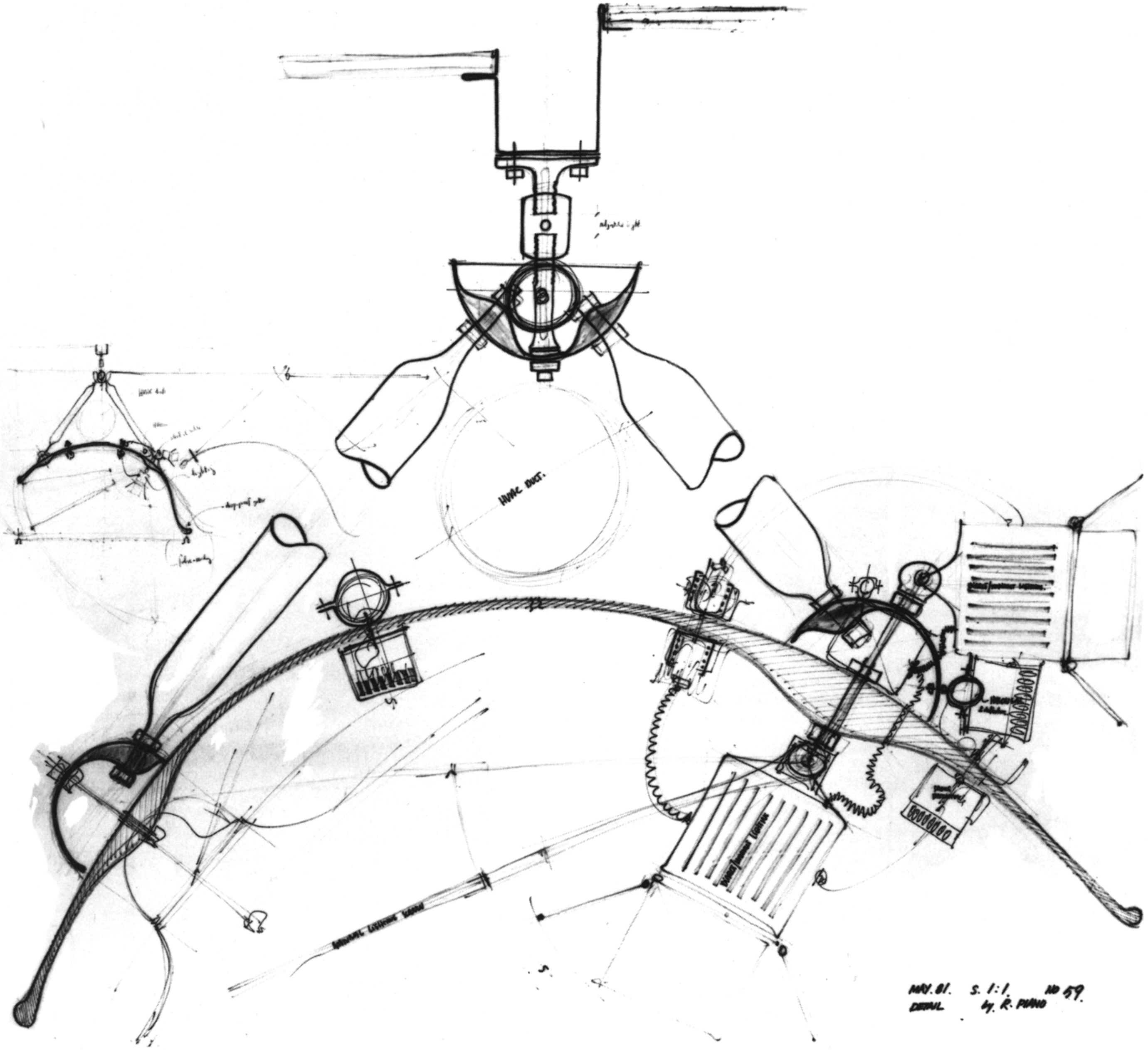
Another drawing produced by Piano on a flight to the United States (figure 53) is a sketch of the leaf element and what happens to it when it meets the wall. Piano drew it during a period of schematic design by the design team, to help explain how the elements of the building come together and the details that still needed to be developed. With this sketch, the other members of the design team could produce a larger drawing to see how well the details actually worked.

Figure 54 is a presentation sketch drawn by Piano for publication, based on an earlier sketch drawn during design development that is not as clear. It was drawn to show the function of the structure in terms of light and the movement of air. The original sketch, also by Piano, was drawn for the design team as a memorandum of things that needed to be thought about.

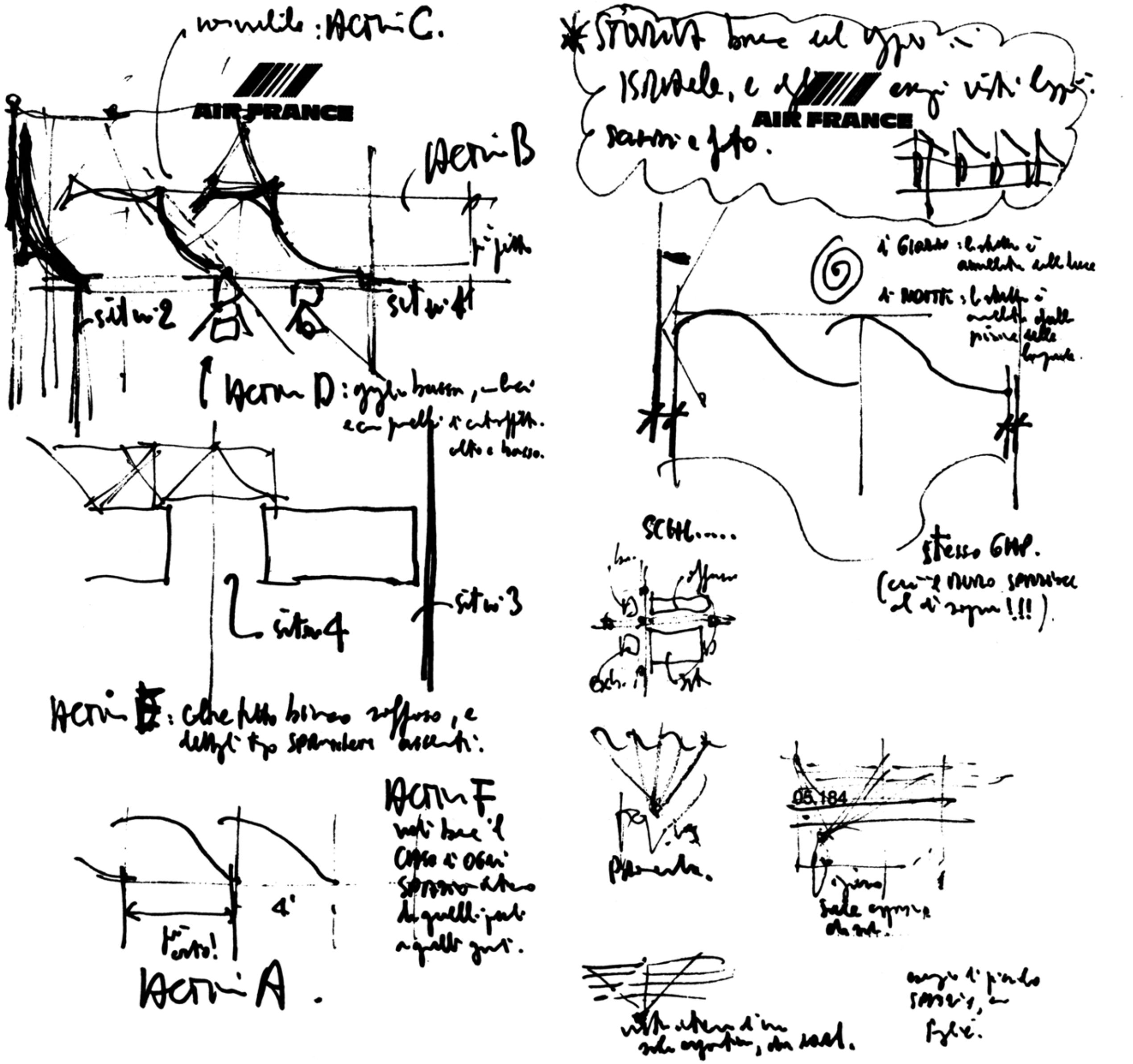
The sketch by Piano in figure 55 was drawn for the design team working out the relationships between wall and ceiling and looking at the way the spaces under the roof needed natural light. Notable is the designing through looking at the details that is found in most of Piano's sketches.

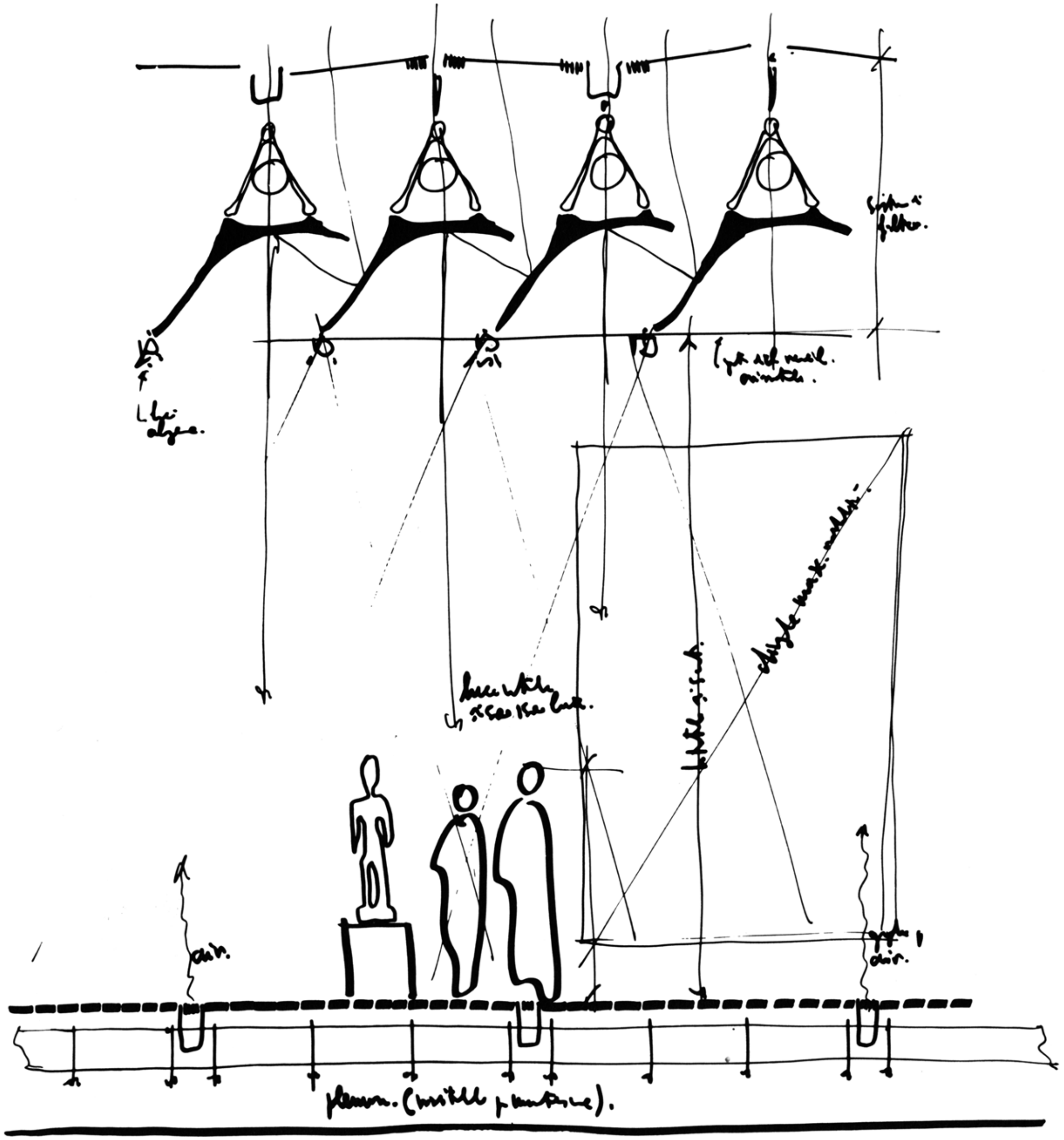
This is demonstrated again in the sketch made by Piano (figure 56) after a one-to-one mock-up was made of a gallery. What the sketch shows is how in the mock-up someone sitting in a normal position would be able to see the sky. When the mock-up and the sketch were shown to the client, she rejected the idea and so the sketch was given as a memorandum to the design team for further development and change. What is of note here is the interaction for Piano between model and drawing.

Figure 57 was drawn by Shunji Ishida for presentation to the client as a summary of the previous discussions and sketches of the way light and air would move through the museum. Another rendition of this was drawn by the engineer Tom Barker of Ove Arup for their own internally distributed publication (figure 58); it represents the more



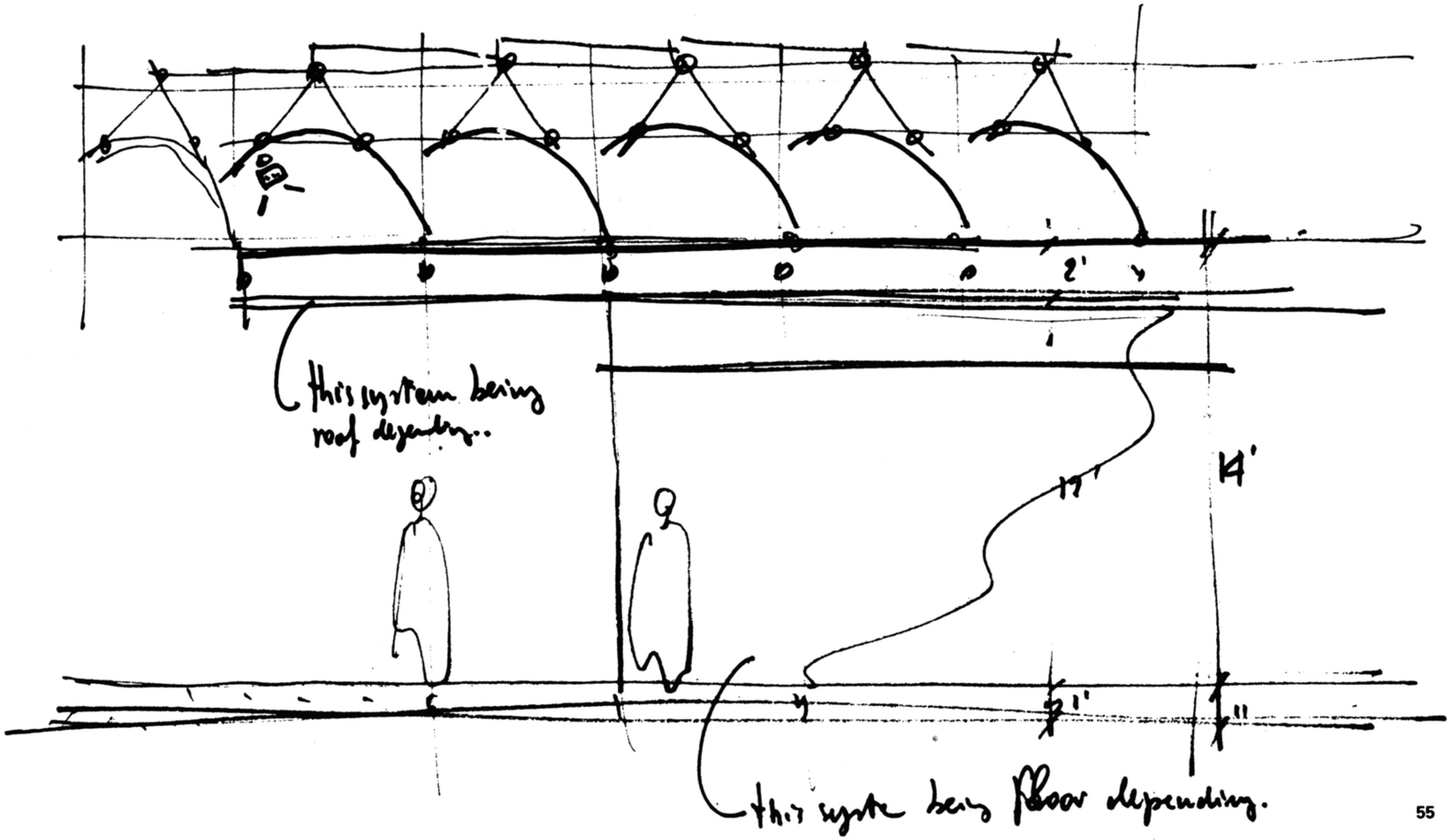
MAY. 81. S. 1:1. NO 59.
DETAIL by. R. PIANO


ACTION C.
AIR FRANCE
ACTION B
sito 2
sito 1
ACTION D
sito 3
sito 4
ACTION E
ACTION F
4'
ACTION A.
ISRAELE
AIR FRANCE
di GIORNO
di NOTTE
SCHL.....
stesso GAP.
05.184
pianta.

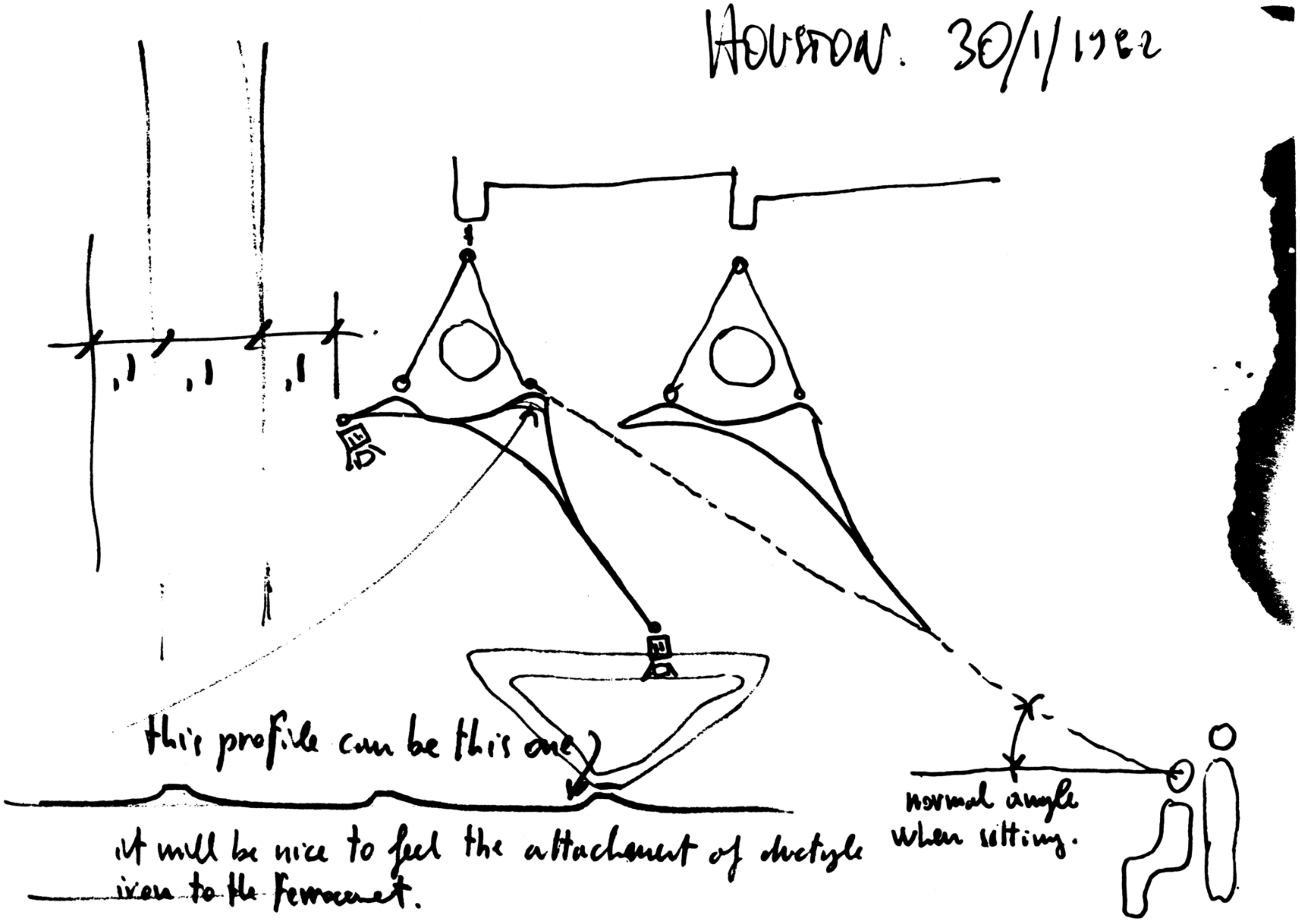


54

INTIMATE SPACES inside EXIBITION AREA.
OPTION 1 (Ceiling + self standing wall).


2'
this system being roof depending..
12'
14'
2'
1"
this system being floor depending.

142

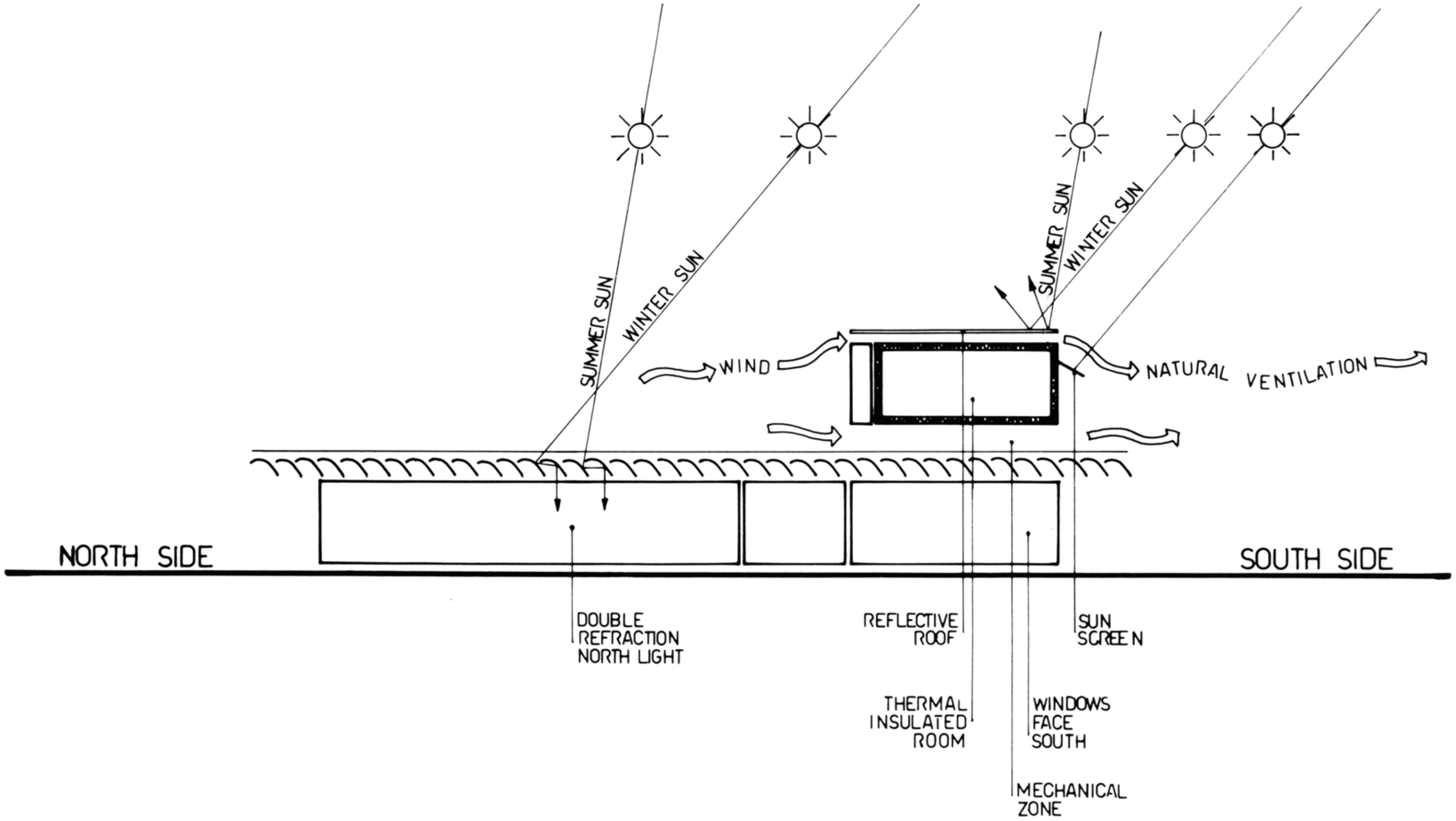


HOUSTON. 30/1/1982

this profile can be this one

it will be nice to feel the attachment of ductile iron to the Ferrocement.

normal angle when sitting.


SUMMER SUN
WINTER SUN
SUMMER SUN
WINTER SUN
WIND
NATURAL VENTILATION
NORTH SIDE
SOUTH SIDE
DOUBLE REFRACTION NORTH LIGHT
REFLECTIVE ROOF
SUN SCREEN
THERMAL INSULATED ROOM
WINDOWS FACE SOUTH
MECHANICAL ZONE

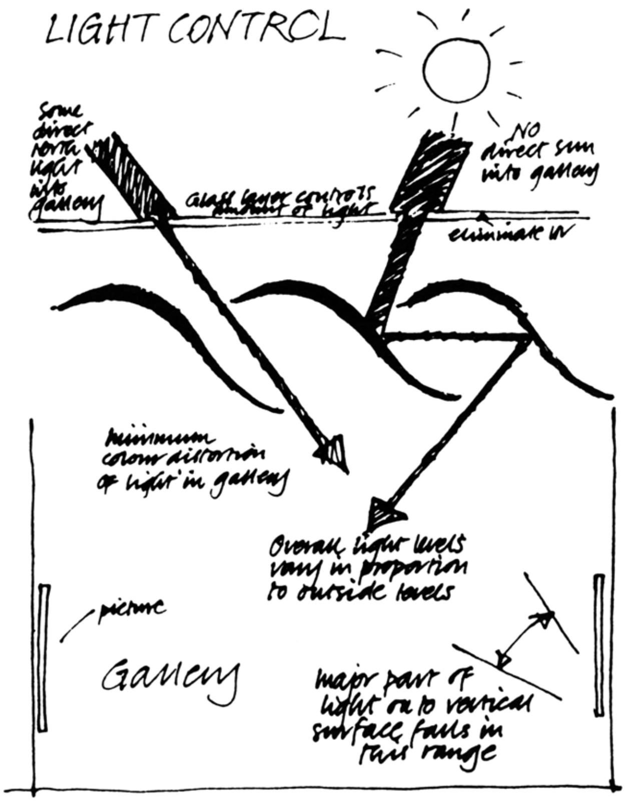
SUN CONTROL

diagrammatic quality of the engineers' drawing compared to those of the architects and for the client (figure 59), which tend to be a bit more scenographic.

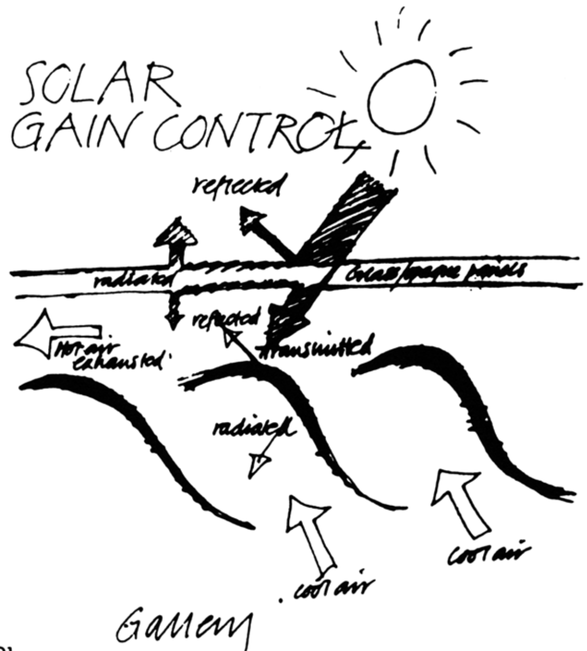
Given the nature of the project and the close cooperation between the engineers and the architects, not surprisingly the engineers did a large number of drawings for the project. Figure 60 was a computer drawing done by Ove Arup to test how well the roof structure worked from a structural point of view.

Because the project was built in the United States, the construction drawings (figure 61) were done in the offices of Fitzgerald in partnership with Piano. While the drawings were being done, Piano had a representative from his Genoa office there to oversee and work with the American partners. The great amount of specification and detail in the drawings was, according to the architects, both for technical control of the construction and also for legal protection given the nature of U.S. law.

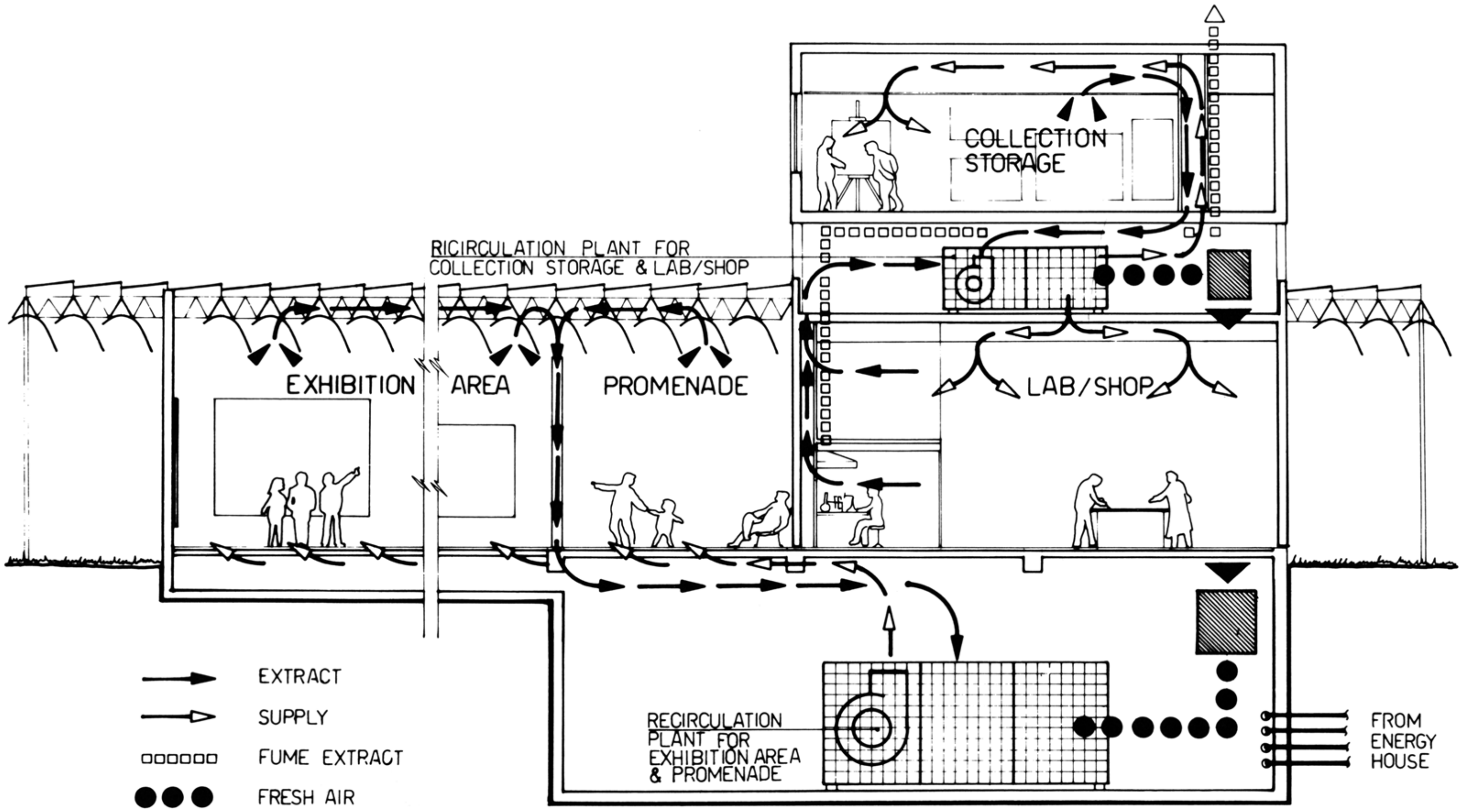
The range of drawings that Piano uses, the close coordination between model and drawing and between engineers and architects, the constant testing out of ideas, and the use of a detail or element to set out the design, all help us to understand to a great extent what Piano's architecture is and how it comes to fruition.


LIGHT CONTROL
Some direct north light into gallery
NO direct sun into gallery
glass louver controls amount of light
eliminate UV
minimum colour distortion of light in gallery
Overall light levels vary in proportion to outside levels
picture
Gallery
major part of light on to vertical surface falls in this range

12a

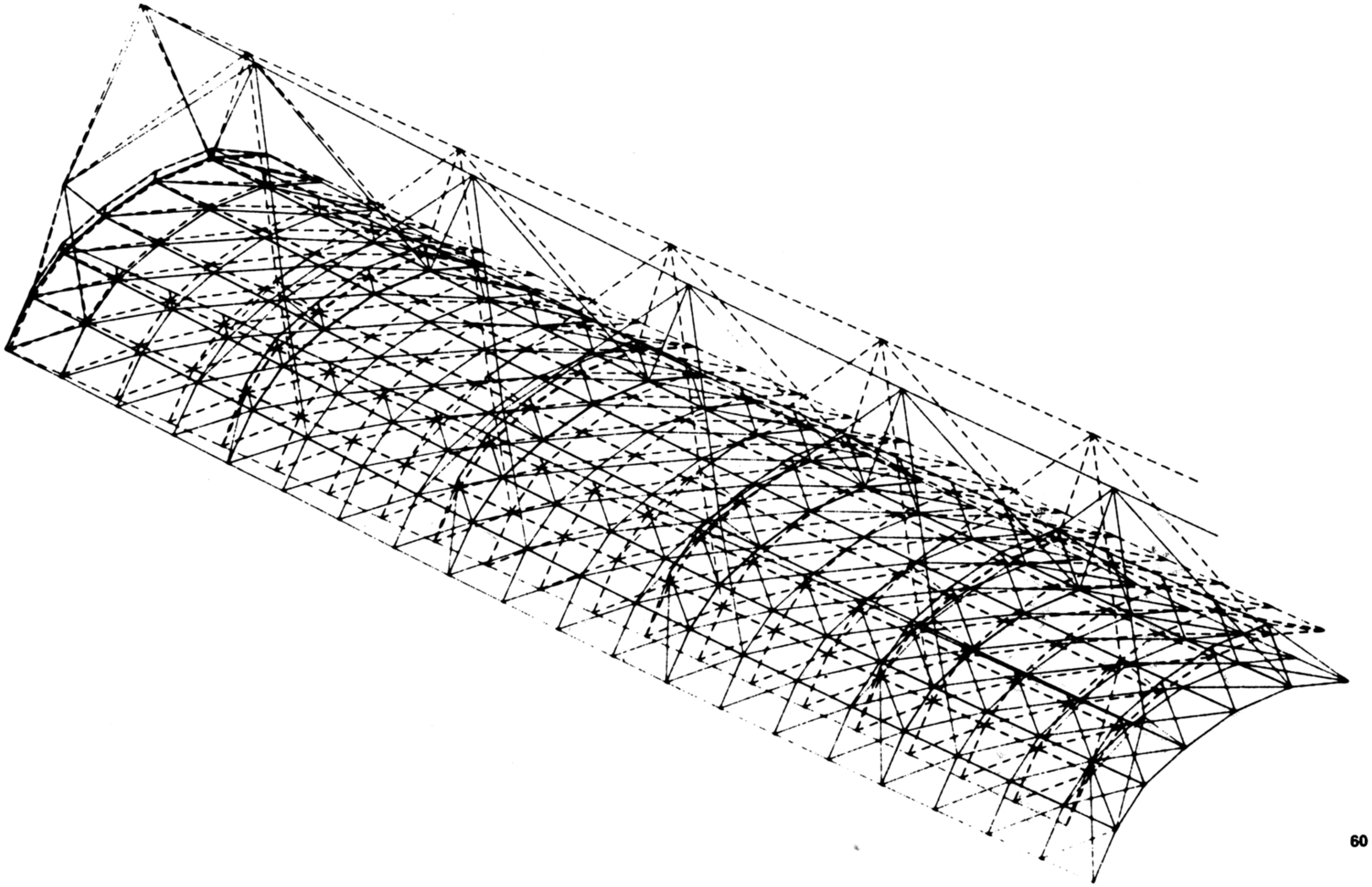

SOLAR GAIN CONTROL
reflected
radiated
glass/opaque panels
reflected
transmitted
Hot air exhausted
radiated
cool air
cool air
Gallery

12b

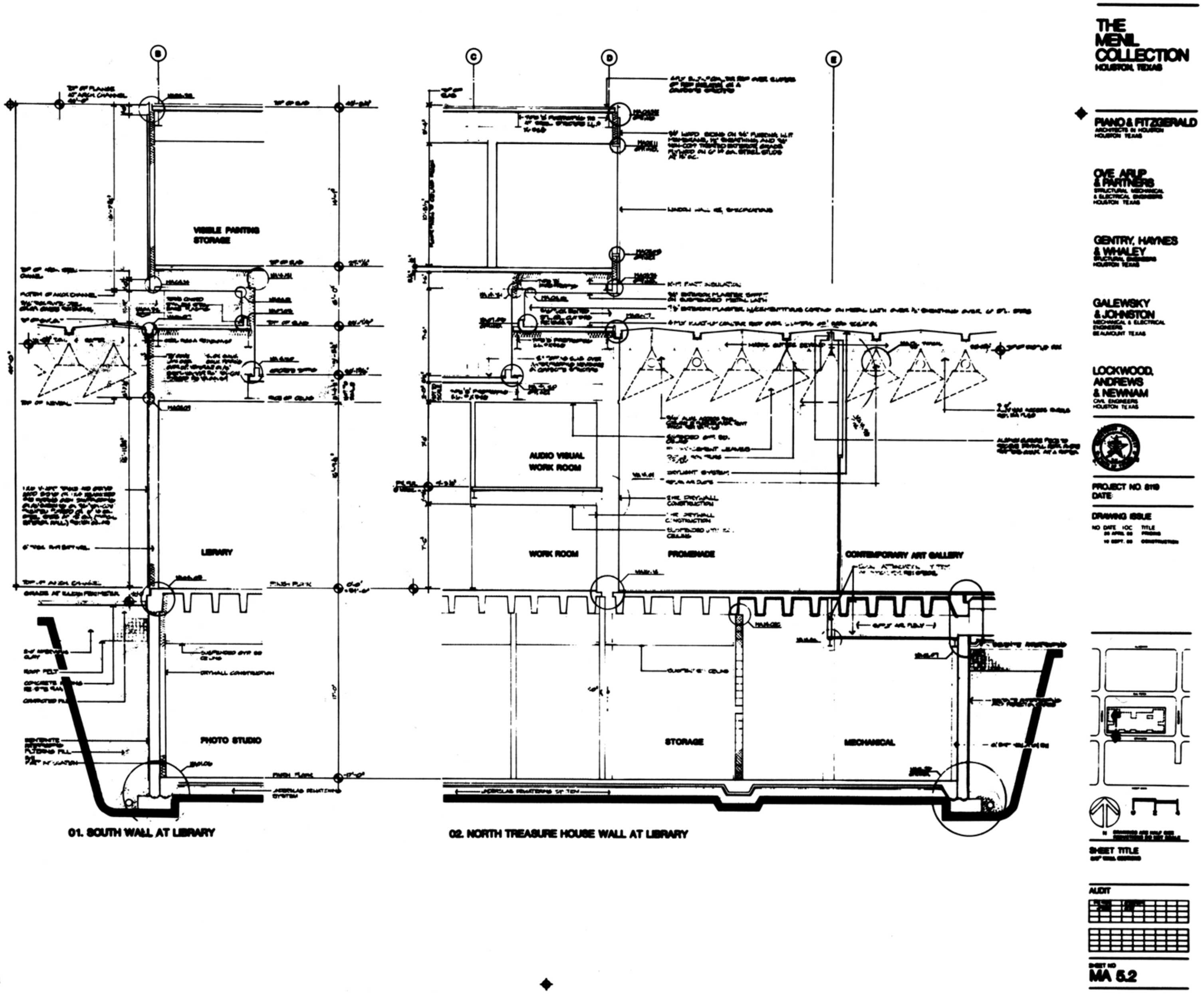

COLLECTION STORAGE
RICIRCULATION PLANT FOR COLLECTION STORAGE & LAB/SHOP
EXHIBITION AREA
PROMENADE
LAB/SHOP
RECIRCULATION PLANT FOR EXHIBITION AREA & PROMENADE
FROM ENERGY HOUSE
EXTRACT
SUPPLY
FUME EXTRACT
FRESH AIR

59

AIR DISTRIBUTION

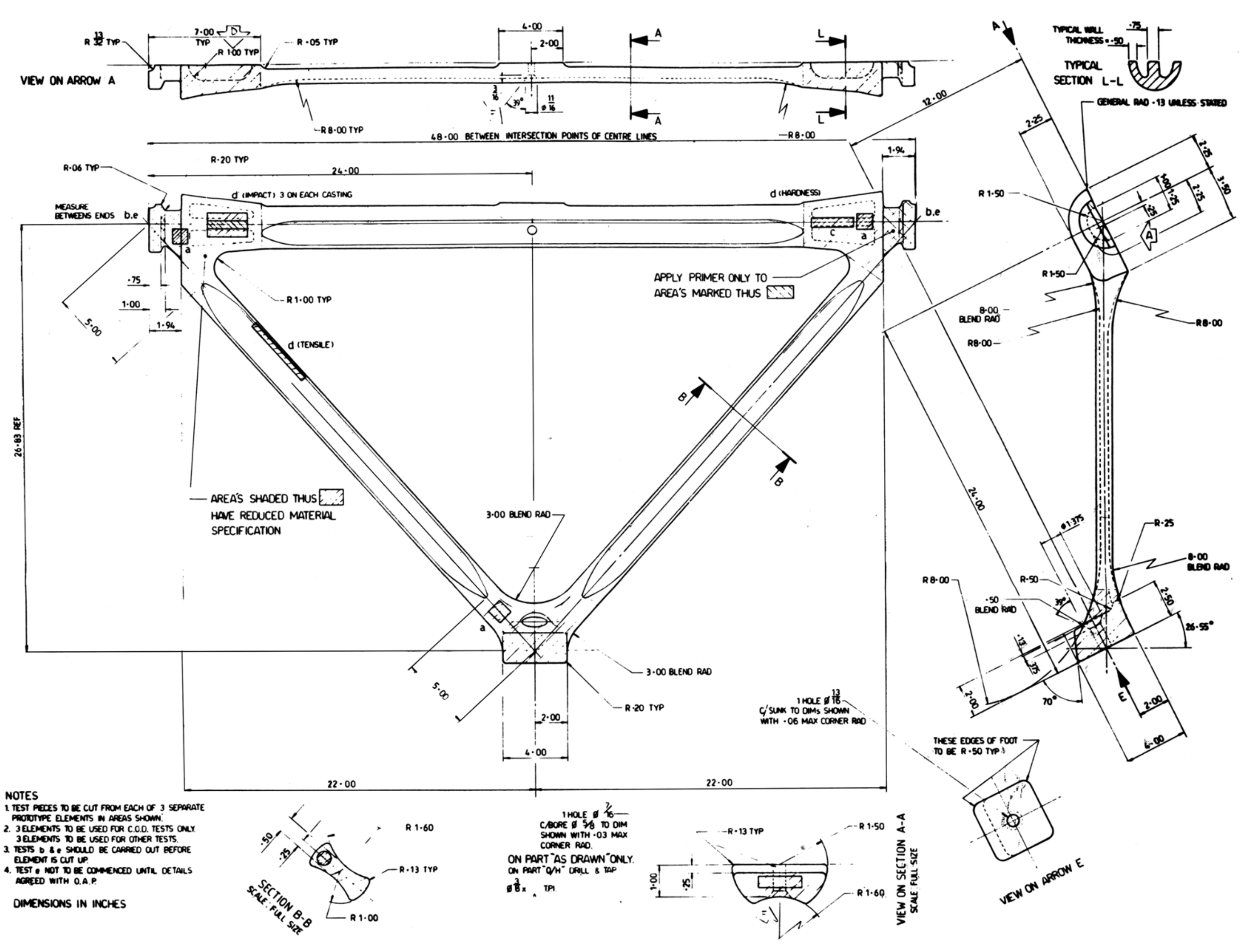


60


B
C
D
E
VISIBLE PAINTING STORAGE
LIBRARY
PHOTO STUDIO
AUDIO VISUAL WORK ROOM
WORK ROOM
PROMENADE
CONTEMPORARY ART GALLERY
STORAGE
MECHANICAL
01. SOUTH WALL AT LIBRARY
02. NORTH TREASURE HOUSE WALL AT LIBRARY
THE MENIL COLLECTION
HOUSTON, TEXAS
PIANO & FITZGERALD
ARCHITECTS IN HOUSTON
HOUSTON TEXAS
OVE ARUP & PARTNERS
STRUCTURAL MECHANICAL & ELECTRICAL ENGINEERS
HOUSTON TEXAS
GENTRY, HAYNES & WHALEY
STRUCTURAL ENGINEERS
HOUSTON TEXAS
GALEWSKY & JOHNSTON
MECHANICAL & ELECTRICAL ENGINEERS
BEAUMONT TEXAS
LOCKWOOD, ANDREWS & NEWNAM
CIVIL ENGINEERS
HOUSTON TEXAS
PROJECT NO. 819
DATE
DRAWING ISSUE
NO DATE IOC TITLE
SHEET TITLE
AUDIT
SHEET NO
MA 5.2

61a

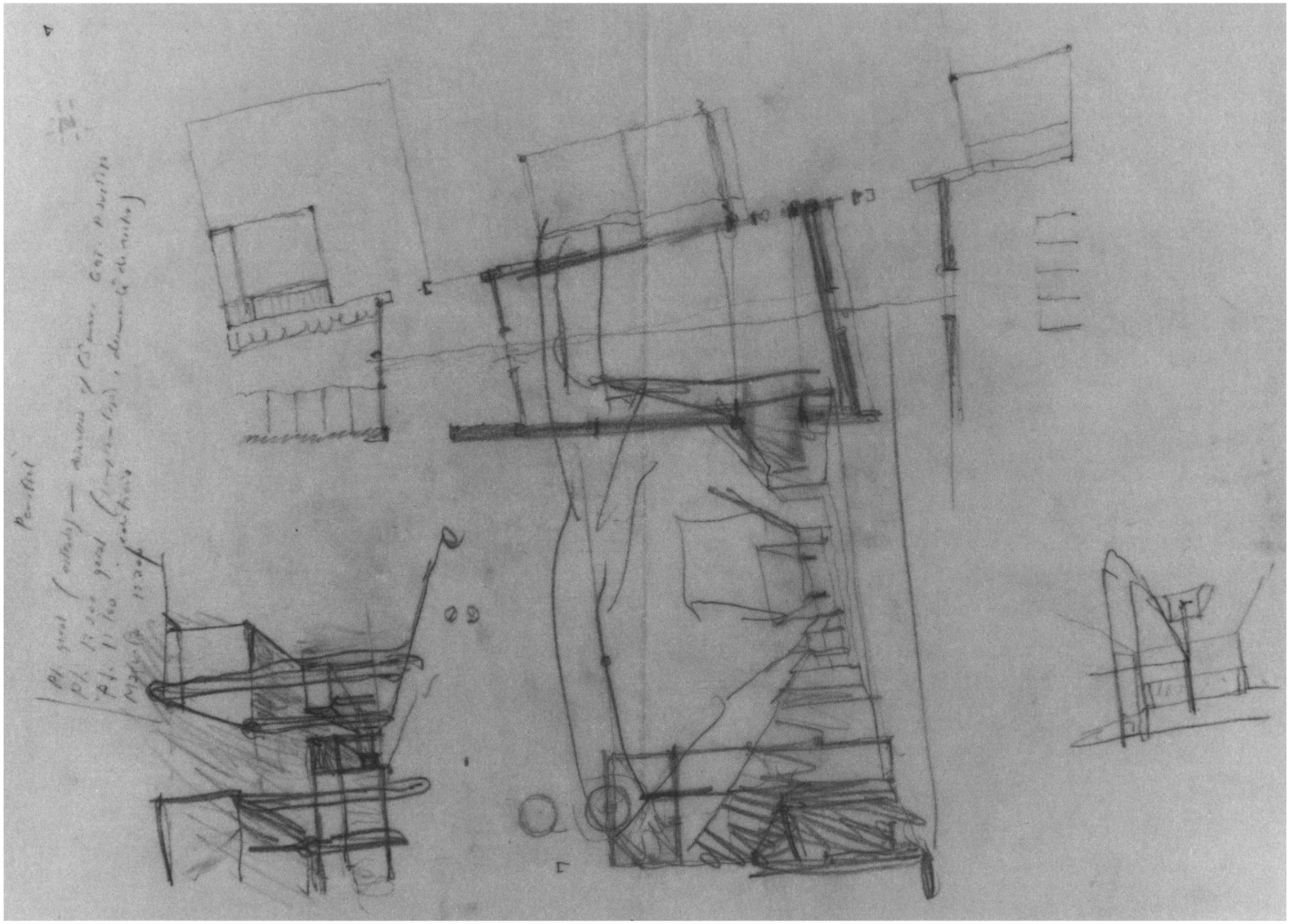
◆


VIEW ON ARROW A
R 13/32 TYP
7·00 TYP
R 1·00 TYP
R ·05 TYP
4·00
2·00
3/16
39°
ø 11/16
R 8·00 TYP
48·00 BETWEEN INTERSECTION POINTS OF CENTRE LINES
R 8·00
A
L
R·20 TYP
R·06 TYP
24·00
d (IMPACT) 3 ON EACH CASTING
d (HARDNESS)
MEASURE BETWEENS ENDS b.e
b.e
a
c
1·94
·75
1·00
5·00
R 1·00 TYP
d (TENSILE)
APPLY PRIMER ONLY TO AREA'S MARKED THUS
26·83 REF
B
AREA'S SHADED THUS HAVE REDUCED MATERIAL SPECIFICATION
3·00 BLEND RAD
3·00 BLEND RAD
R·20 TYP
2·00
4·00
22·00
22·00
1 HOLE ø 13/16 C/SUNK TO DIMS SHOWN WITH ·06 MAX CORNER RAD
12·00
TYPICAL WALL THICKNESS = ·50
·75
TYPICAL SECTION L-L
GENERAL RAD ·13 UNLESS STATED
2·25
R 1·50
R 1·50
3·50
2·75
1·25
1·00
·25
8·00 BLEND RAD
R8·00
R8·00
24·00
ø1·375
R·25
8·00 BLEND RAD
R 8·00
R·50
·50 BLEND RAD
39°
2·50
26·55°
·13
·375
2·00
70°
E
2·00
6·00
THESE EDGES OF FOOT TO BE R·50 TYP
VIEW ON ARROW E
·50
·25
R 1·60
R·13 TYP
R 1·00
SECTION B-B SCALE: FULL SIZE
1 HOLE ø 7/16 C/BORE ø 5/8 TO DIM SHOWN WITH ·03 MAX CORNER RAD.
ON PART "AS DRAWN" ONLY.
ON PART "O/H" DRILL & TAP ø 3/8 x TPI.
R·13 TYP
R 1·50
R 1·60
1·00
·75
VIEW ON SECTION A-A SCALE FULL SIZE

NOTES
1. TEST PIECES TO BE CUT FROM EACH OF 3 SEPARATE PROTOTYPE ELEMENTS IN AREAS SHOWN.
2. 3 ELEMENTS TO BE USED FOR C.O.D. TESTS ONLY. 3 ELEMENTS TO BE USED FOR OTHER TESTS.
3. TESTS b & e SHOULD BE CARRIED OUT BEFORE ELEMENT IS CUT UP.
4. TEST e NOT TO BE COMMENCED UNTIL DETAILS AGREED WITH O.A.P.

DIMENSIONS IN INCHES

61b


Perfil
Pl. geral (estudo) — [illegible]
Pl. 1:200 [illegible]
Pl. 1:100 geral ([illegible]), [illegible]
Maqueta 1:200

Alvaro Siza Vieira,[3] a Pritzker Prize winner who heads a firm in Porto, Portugal, sees drawing as the crucial instrument of conceptual control and communication of the architectural process. Along with drawing, models take a significant place in Siza's practice. However, at the core of his practice are the drawings, from earliest conception right through the realization.

For Siza, the issue of communication and control over one's design is particularly important in relation to the context for realizing building in Portugal—especially rural Portugal. Moreover, as both a practitioner and an academic, he is acutely aware of the possibility of misconstrual within the process of design and realization of architecture.

Siza immediately took up the issue of perspectives in the discussion about appropriate modes of architectural presentation and investigation. Like some architects, he is emphatic that he did not like to use perspectives as the basis for presentations to clients. Rather he finds, because he makes models from the very beginning of a project, that **models are more useful for the study of a project. I make models as a supplement to the research and then I show them to the client. I must say that this is an option for me because I work for the government and for people who know me and want me to make the project. If I wanted, let us say, to sell a project to some types of clients, I would probably be obliged to make perspectives. But I don't like perspectives made expressly to show the owner. What a perspective shows is very elementary and easily a kind of fraud so that people can accept your idea. But it doesn't let people understand what really is the idea. So I use other means of communication.** These other means include talking about the design and using models, but models that are rather less naturalistic and more abstract. The abstract nature of the model provides Siza the opportunity to explain the model and provide more depth of understanding to clients or even to those in his office.

However, while Siza doesn't use perspectives for presentation, he does use perspectival freehand sketches for his own investigations. He most often uses them to define small elements in order to better define the interior of a project. With a perspectival image, Siza feels he can **draw through the model so that I can from a small-scale model simultaneously take a part on a bigger scale so that I can control parts of the interior and so and so.** How Siza works at the beginning of a project varies with the client he has and the program for the project: **For instance, if my client is a corporation where I have to explain and receive information because a program is never enough—a written program—I must get more information and also more subtle ideas or objectives that people have. If it is a community or some group, I must discuss for some period the development of the project with the people of the group or their representatives. If it is a private owner or**

they are friends or people who know my architecture, the discussion can be more intimate. These variations in approach based on the type of client also affect how Siza prepares and uses drawing to present his ideas: **After I receive a commission, if it is a small project, after a few days I present sketches that are still very vague. Together with the sketches, I give schemes of the functional organization. So these sketches are in a way my first ideas fixed through an instrument [drawing]. I also use these drawings to provide hypotheses for a reaction from my client so that he can be more precise and say "no, I don't want this, I want more in another direction," and so and so.**

Of course, if I work for an institution, for example the building of a school, where I present to a committee, the first presentation must have concise materials, organized. When he works with a friend or someone who knows his architecture, Siza is more likely to show that client his first tentative sketches that he uses to actually engender a concept for the project. With more institutional clients, he still does these early sketches to find a conceptual approach to the project but he is not likely to show them to the client. Rather, after these sketches have provided a direction, he produces more formal representations of these early ideas. The differences in approach for Siza are defined by his ability to know that his approach to the client will not be misinterpreted. **I can give a not yet definitive and still vague representation to someone to provoke a change of ideas or a more rigorous approach if I know that person and know that it is someone who I can be open with and enjoy a clear and direct discussion. If I have a relation with a person in an institution who I know and is able to understand that kind of direct discussion, then okay, I can work like I do with a friend.**

If I don't know someone like that I must be more careful, because some clients can consider it foolish to appear to have a lack of method. There are many preconceptions about methods [for design] in people's minds, and these preconceptions make me be more careful. Once the concept for a project is defined through Siza's sketches, these become the basis for the work of the design team. Even though Siza's is a small firm, the amount of work he gets makes it impossible for him to do all the drawing he would like: **At this moment, there are very few times I can sit at a table and make rigorous designs. So there is a team that develops projects with models and rigorous drawings.**

One of the reasons I always use the sketch—I have pockets with sketchbooks—is to maintain a constant relation with the development of the drawing [by others] so it doesn't get out of hand. While Siza essentially sets out the conceptual basis for the project through his sketches, he continues to sketch throughout the process of design development. After he has left the conceptual sketches and discussed the work to be done, others in the firm take up the development of the design. For Siza this is not out of choice, as we noted, but out of necessity. To keep on top of the projects, he meets with the members of the design team and leaves sketches as guides for their ongoing work: **When problems come up and when we need to be more precise through rigorous design or model, the discussions with the team must be included in the development. For that I use quick sketches. I need always to maintain this kind of dialogue with the more complex development of the project so I can maintain control over what is being made.** Though he prefers to work directly with the first phase of design, Siza finds that sometimes other members of the design team must represent the firm at early meetings. This, he feels, while necessary, does create a certain distance between himself and the project: **In some work, on the contrary [to what was said above], the office has important work in the first phase. For instance, suppose there is a complex program—this happened recently—and it needs to be discussed. I can charge someone in the office to study this program, to establish close relations with the responsible people of the client, to put clear the program and the character of the building. I can go then at a certain distance to the project but also participating. But someone from the office would be the main developer and would do the main study of the project.** The distancing is not always a problem, for sometimes it presents new possibilities. **Like Peter [Testa] made the first study of the School of Architecture. He studied the complex program, spoke to the client to put things clear, and spoke with me to exchange ideas. In a way, this made me free to think about solutions in a rather instructive way. The knowledge Peter had of the basic problems and program could inform me. And I could ask him "is this possible?" and he could say "yes" or "no."** Normally when others in the firm work at this early a stage they do not produce many sketches or drawings. Rather they work with the model to define the basic arrangement of the project. What drawing is done by others at this stage is likely to be schematics, both freehand and hard-edge, to understand area requirements in order to set out a context within which Siza can work on conceptual drawings for the project.

During the work of conception and development—which for Siza are not really separated in time but in the level of detail—sketching and more systematic drawing proceeds apace: **Making sketches without making at the same time more rigorous drawings is good for nothing. It is absolutely necessary to do both at the same time.** What Siza uses at this stage for the more rigorous drawings are plans, sections, and elevations, often on the same page. These form the critical drawings for what Siza calls "the research" into the design solution.

Axonometrics are used mostly for communication rather than for research, but only within the office or with other professionals. He will use axonometrics to demonstrate complex and difficult ideas about the building's organization to clients when necessary. For the most part, though, Siza believes that axonometrics are "too abstract for lay people." What he prefers to use to communicate to lay people are what he calls composites: **I prefer to use composites for people who are not specialized to discuss the project. I project slides with sketches for discussion because in the collection of the sketches there are some that may well express, sometimes more than a fine painting, a building or how it looks against a context. So I use this method many times.**

At the point where Siza moves from development to realization he is presented with a problem, given that his work is for the most part built in Portugal. While it is possible to build in Portugal without detailed working drawings, Siza does not believe in beginning a project without having extremely precise working drawings: **If I want to achieve quality I have to design everything. So normally we make the details to organize the competition for the builders. Most drawings we make to the norms of construction and the experience we have. This is good to choose a builder.** Not only is drawing the details important in helping to choose a builder but it gives Siza a sense of final control over the design; a sense of the quality of the design: **I make [working drawings] for quality control. I draw to the end.** Siza prides himself on his capacity to draw precisely and within the context of the design. For example: **I can still make, in some cases in Portugal, a detail as an architect in the tenth century could make. I can think of a system of forms for a building which can effect and unify all the details to make the building special.** Partly Siza draws this way to gain insight and control over the design. The methods he uses in producing working drawings are also profoundly influenced by the nature of the building industry in Portugal. On the one hand, after working drawings are finished and the project begins, it is not unusual to find that the contractor does not have the right machines or the ability to build what is drawn. In that case: **During construction when you are in contact with the real workers you have an interview with them and you ask "is this or that okay?" If they say this is difficult because they don't have the right machine or so, we make an agreement and we change, but not totally. We make an adaptation so that the workers can do it. We redraw it too.** On the other hand, the limits imposed on the architectural drawing are social: the workers in much of the interior of Portugal do not know how to read working drawings. Siza still produces all the detailed working drawings for his own uses but needs to adapt to the exigencies of the social forms of labor in the countryside: **In some circumstances, I think if you make a work in the interior of Portugal, the workers simply don't understand these drawings. So they [the drawings] are simply good for us to have the project controlled.**

In those places, we can find very good workers. Only they don't know how to read the drawings and sometimes don't know how to use all the traditional forms of their region. So you need to make an improvisation according to the local possibilities. The details [the drawings] work for you to make that improvisation within the system of the drawings. That is control for yourself. When making the improvisations, Siza uses more accessible forms of drawing to enable the craftspersons to realize his design: **When I translate from a certain detail, I have to make a perspective on a wall during construction. Not so long ago a worker, a very good worker but one who could not read drawings, told me he thought I was a good architect but another architect was so good he didn't need to make drawings. For him the capacity of improvisation, and you can understand his point of view, was the real capacity of architects. But we still make the whole collection of rigorous drawings and details, but we have to make a translation and sometimes adaptations for the workers.** Architects in Portugal often work in two worlds, the traditional and the modern. For this, Siza argues, you need to be flexible, but flexible in a way that does not give up your control over the quality of your design: **You need a big flexibility to represent or to communicate your ideas to the team of contractors. But I don't believe in the maintenance of a world without divisions of labor. In reality they exist. So if you don't use rigorous instruments you don't achieve quality even in a rural village.**

The use of drawing to control the process of design and its realization is a factor not only at the level of construction but within the office itself. As Peter Testa remarked: **I think it is important to make the point that in fact in the office through the process of drawing Siza is able to control the work.** Siza agrees that one immensely critical way to control decisions in the office is through drawing. When asked directly if he controlled decisions through his drawing, his answer in a word was "yes." For Siza, **If you want quality someone must be in control.** This sense of control spills over into the methods he uses when working with engineers. While he does not have engineers in his office, because he prefers to maintain a small team that is as flexible as possible, he does work with engineers from another office that also has architects. But he works with them only for technical support, and he meets with those who will provide technical support only after he has finished the conceptual phase of his work.

When working with engineers, Siza usually discusses the project and they begin making calculations for the building. He incorporates these findings into the design. More often than not, **I have to change something, I have to think of a new system.** Generally, Siza gives the engineers a series of rigorous drawings with which to evaluate the project and undertake the appropriate calculations. In return the engineers provide **a set of definitive drawings. Then we have to verify everything to see if it is okay and to make some changes of measure in our own drawings. So in the work of construction it is the architects' drawings which are used in the measures. The engineers make the basic drawings but changes on site I draw myself.** Not only does Siza redraw the engineers' drawings, he most typically reenters the project during the late phases of development to assure himself that the work is precise. As Peter Testa points out, to do this Siza uses a unique form of synthetic drawing to test the basic dimensions of the design. In Siza's words: **That is the kind of multiple-objective drawing which synthesizes all the important elements for the definition of the space. It is a rigorous drawing. I make, for instance, an *a posteriori,* I superimpose on the drawing which is already developed to correct the proportions of the rooms.**

I do this in the middle when the project has an absolute definition; it is designed already but the details are not yet made. Through the use of drawings like this, Siza can constantly reenter the process of design and keep control over its direction. He takes full measure of the opportunity drawing has provided architects to control projects while being physically removed from their production: **I can be in Boston but I am not away from my projects.** Siza employs the same precision and control in the choice of drawings to use in his various public roles as teacher, architect who publishes his work, and competition entrant. As a teacher, **If I make a seminar for students, I will not say I show everything but I will show every phase of the process of design; a choice of drawings showing every moment. I do that to explain the sources and definition of a project. That for two reasons. First, to demystify the project and show that it is something always very systematic and coming from a certain knowledge. There is in every project a large part of uncertainty and the search for a solution always has a certain rhythm, a rhythm that is never the same and depends on many things.**

How things get systematically studied and how they become rigorous is something that is built through stages of visitations and searchings. Drawing for Siza is thus both the instrument with which to pursue the search for a solution and the medium through which to communicate and educate about that search.

While Siza will show students a large number of sketches and drawings, to architects he is somewhat more circumspect. While **I have the illusion that I can show everything, actually I am not so sure I do show everything.** Usually when giving a seminar for architects or in discussion with them, specific issues are being discussed. For this reason, **I have to choose material that illustrates the special aspects of the project and not the total process of the project. That [the process of design] is in my**

opinion very personal and circumstantial. If you work in New York you can't use the same methods you use in Porto. So with architectural colleagues, I make a different selection of drawings [than with students]. While Siza takes great care in his presentation of self through his drawings, he does not produce special drawings for publication nor, like some architects, does he make special presentation drawings for clients. If he makes special drawings at all for presentation, it is for competitions: **For instance, if I make a competition for ideas sometimes I make them different for Italy or Germany.** Because in competitions, according to Siza, there is often no program or at least no elaborated program, all you can present is an idea but one that needs to be especially elaborated through drawing. For this, **it is necessary to make some special design or take some special perspective. If I don't have a precise program as in a real process, there is a distance, a mediation in these competitions for ideas; so you use a different language. If we must consider this kind of distance, then it [the competition idea] is some dimension of the idea and not the whole.** For Siza, the careful choice of what type of drawings to use in the process of design or to present to the architect's various publics derives from a strong sense about what design is and how it should proceed. So he will not normally use sketches in a competition presentation, because a sketch implies something very specific in design: **I don't use sketches in idea competitions. A sketch is something unique. It can be artistic but meaningless. To be the contrary, it must be informed by real strong things that are very precise and very real. A sketch, if it is to mean something and not just be vague, it is because it is charged with real problems you cannot yet dominate. So a sketch represents the issues.** Drawing then for Siza is the very essence of the process of design. What you draw and how you draw it are not a matter of technical competence alone, but of your very sense of how to create and realize architecture. This attitude becomes most clear when looking at Siza's actual drawings and their use in his design process.

The project chosen to exemplify Siza's work, a children's school in Penafiel, Portugal, is one of his more modest yet problematic commissions. Located in a rural area of Portugal, it was built by a series of builders some of whom could read conventional architectural drawings and some of whom could not. This forced the architects to visit the site and guide construction more than is usual. Furthermore, there was little coordination as the client changed in the middle of the project.

Designed in 1984, the project faced difficulties from beginning to end: **The project began in a strange way because the owner asked a builder to design it. The project was so bad the owner came to us to redesign it. I used the same general organization and I was con-**

strained by the site and the costs given the original builder. I also brought in a good builder but the owner brought in local builders as well and they were not so good. So I had problems as the drawings were often not enough to explain the project for the local builders. When we look at the project, what is most noticeable is that for Siza drawing is a back and forth process and works as a kind of dialogue between him and the project and him and his collaborators. The discussion of the drawings here was provided by Siza, moving back and forth among conception, development, and realization without chronological linearity.

Siza began the project with a plan set out by the original builder, which he then began to change. The earliest drawings are what he calls "nonrigorous sketches," which use a number of projective techniques in a dialogue with each other to help derive a design for a project. Figures 62 and 63 are very early sketches by Siza that examine a number of issues (e.g., the relation of the interior to the exterior, the plan and its relation to the volume).

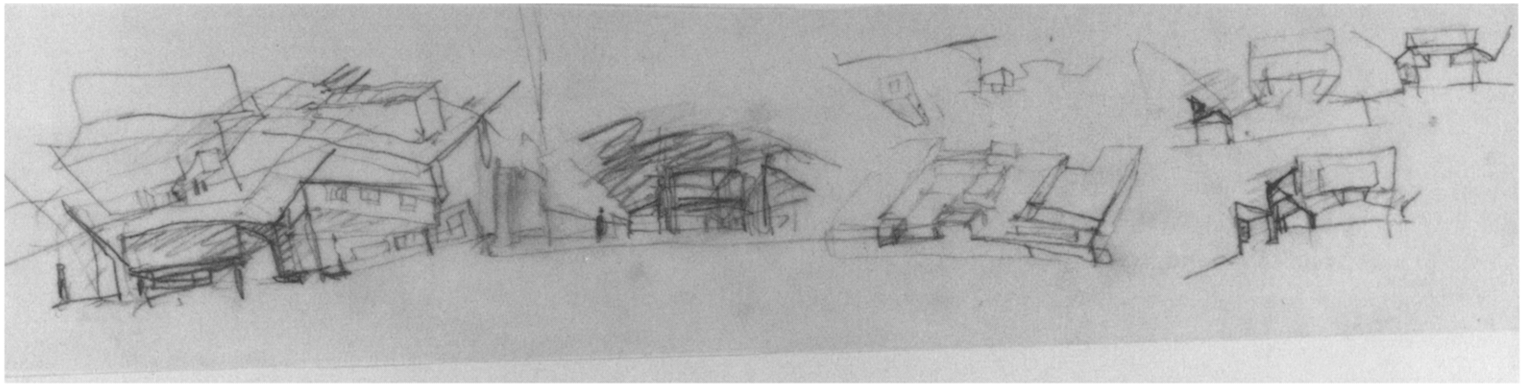
For Siza it is important to understand a design in terms of its context and how the massing of the building will alternately affect and be affected by its site. The sketch in figure 64 looks at the building on its slope through both elevations and sections.

Early on, too, Siza prefers to have rigorous as well as nonrigorous studies done for the design. As a result, rigorous drawings are done either by others in the office or by Siza himself. In figure 65, a rigorous study, the relation of plan to the interior and interior dimensions in the section are studied.

Often when given a drawing, Siza will overdraw on it, adding his own investigations to those of others working on the project. Collaborators work on early sketches produced by Siza, who in turn works on the drawings produced by his collaborators in the office. This process of dialogue continues throughout the design.

Figure 66, a very early conceptual drawing, is an attempt to form a relation between the plan and the volume, the general organization of the building and the relationship between shape and function: **Volumes often force you to change the plan.** Figure 67 is another sample of a drawing, this time done by Miguel Gates, which would eventually be corrected by Siza.

Siza also uses engineers' drawings as a basis for his final decisions. Figure 68 is a topographical drawing that Siza got from the engineer very early in the process. From this he did sketches that were again the basis for development by Gates: **Made after our first proposal. I discuss it with him [the engineer] and then the engineer draws based on my drawings. We usually speak with the engineer from the beginning but he makes drawings from the middle of the project.** After the first talk with the engineers, Siza as well as others in the firm undertake a



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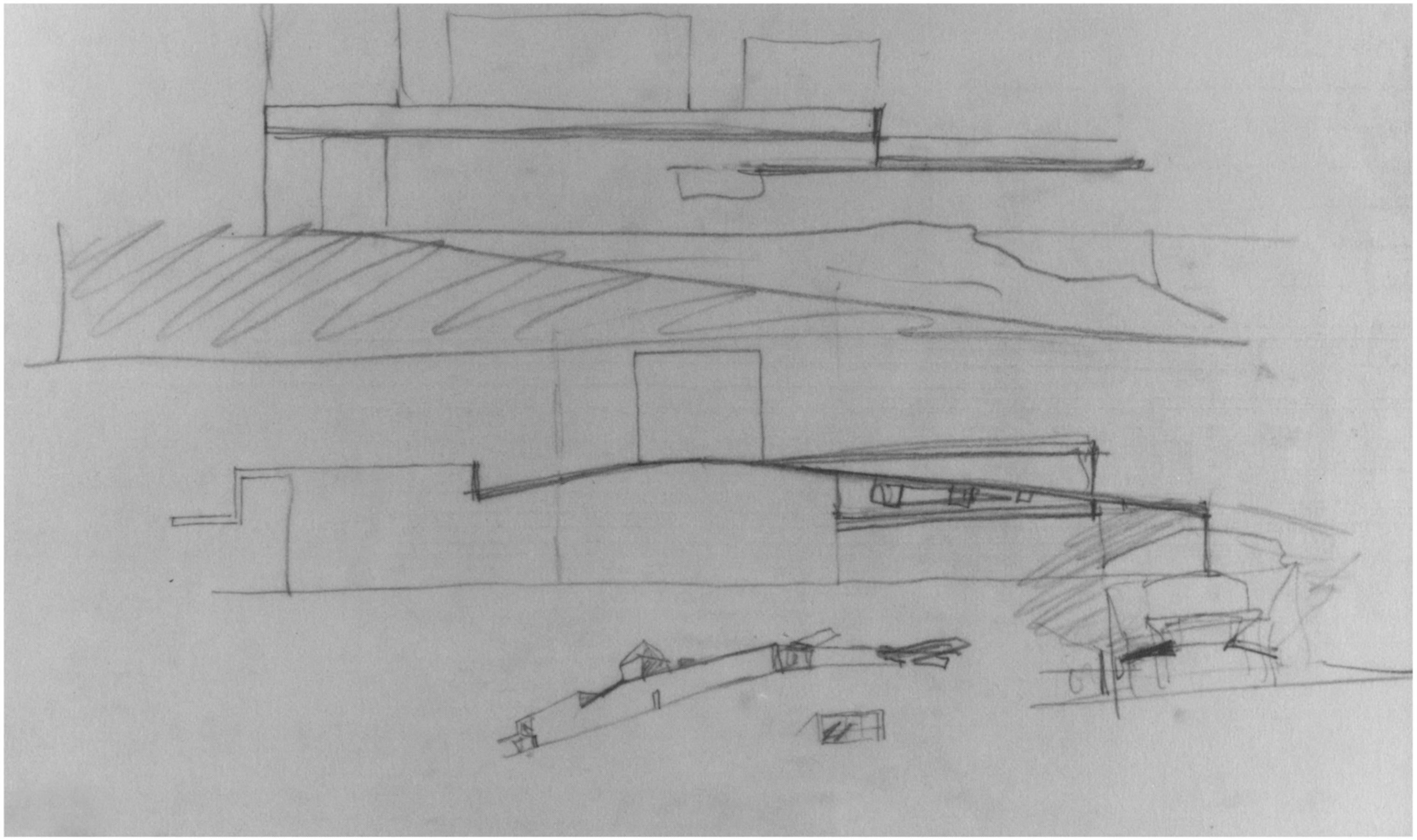

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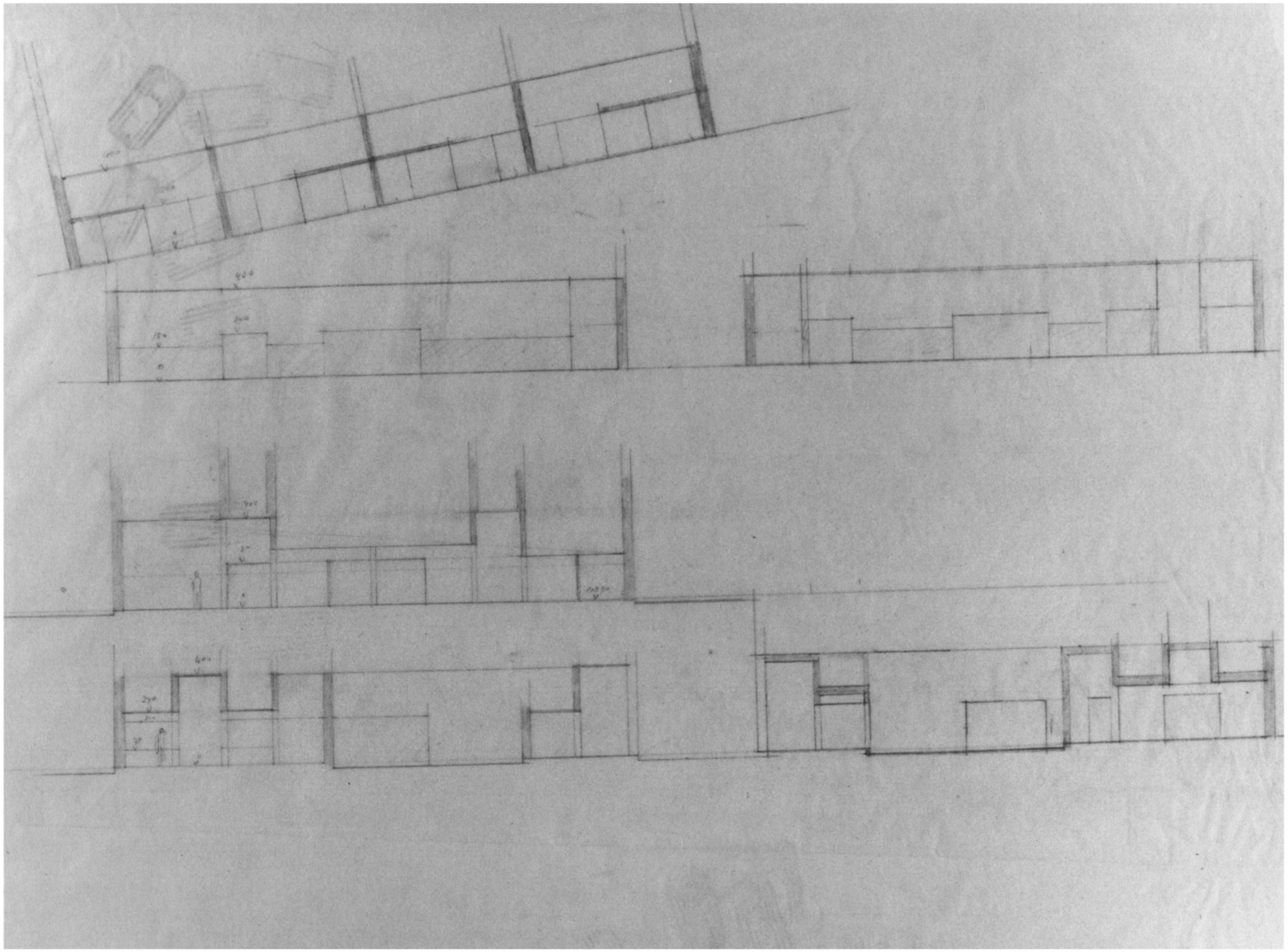

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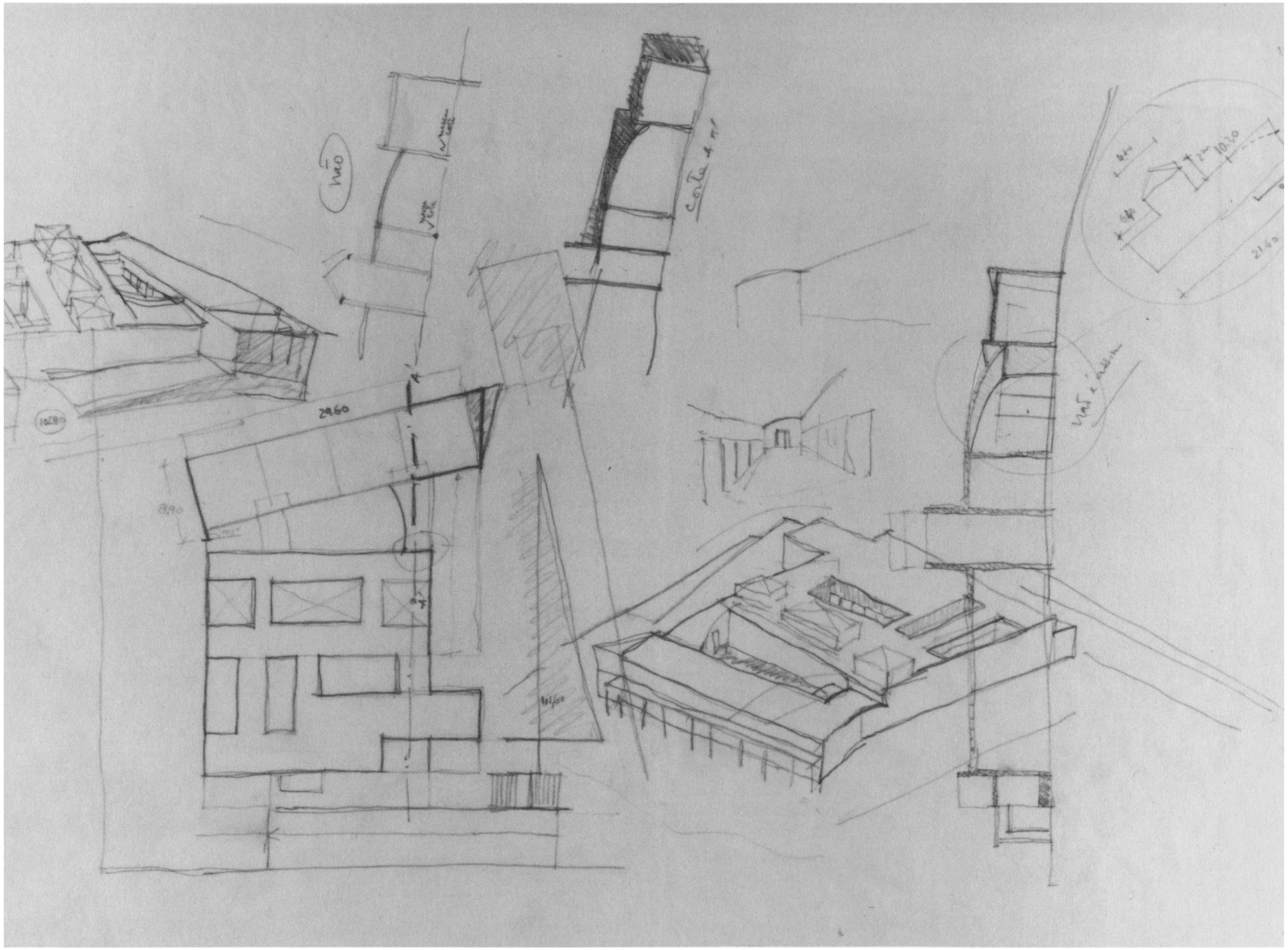

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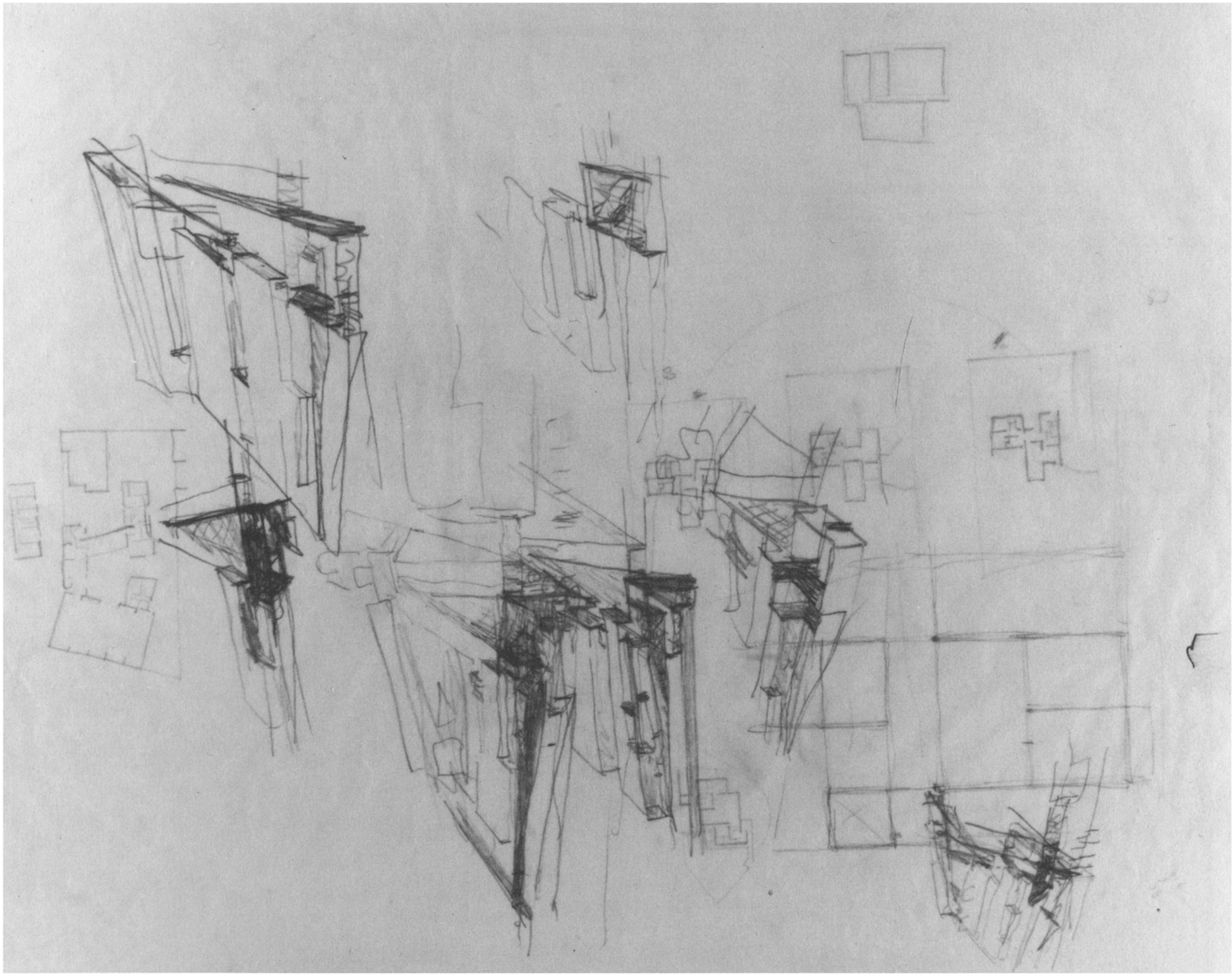

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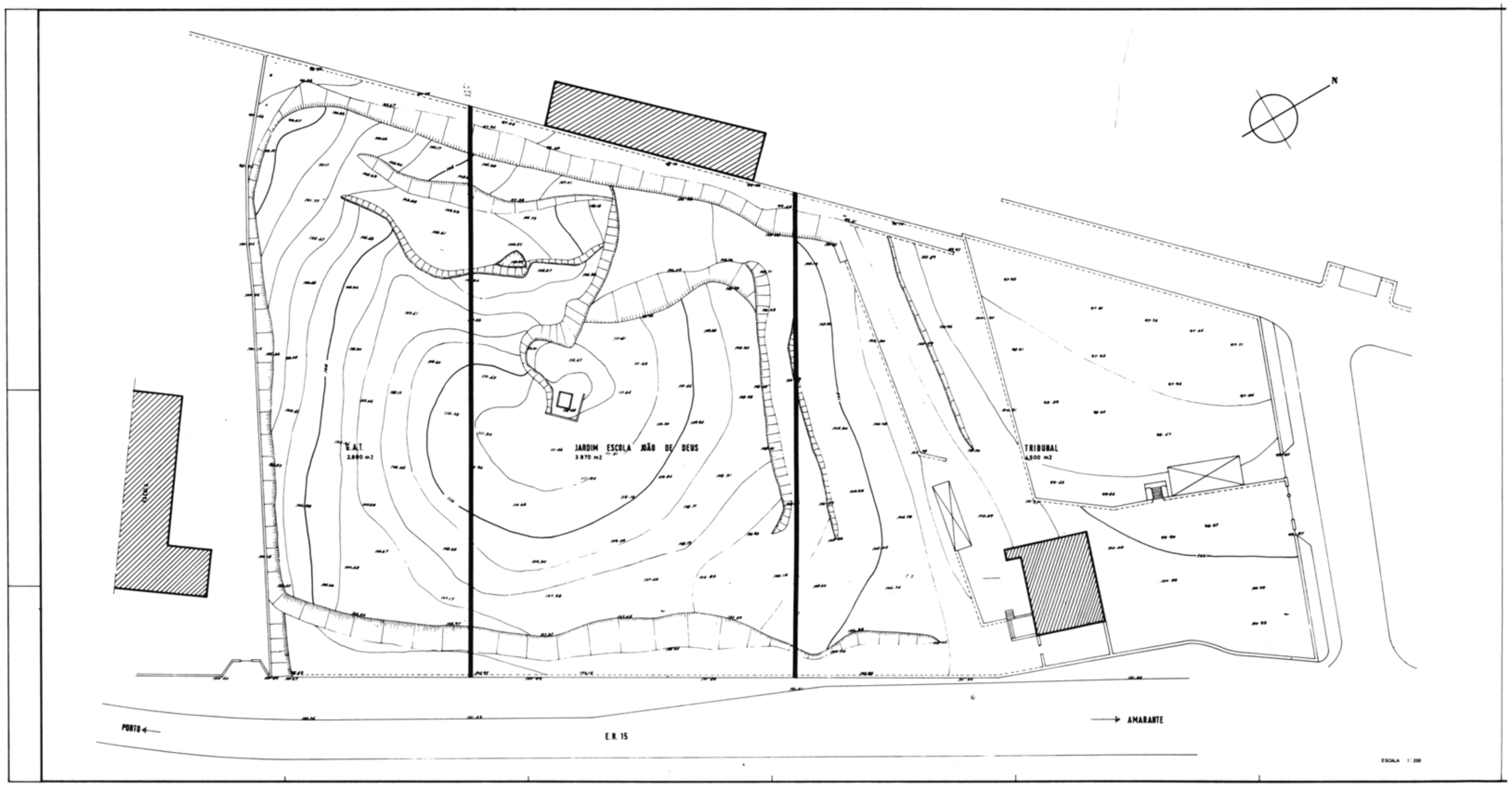
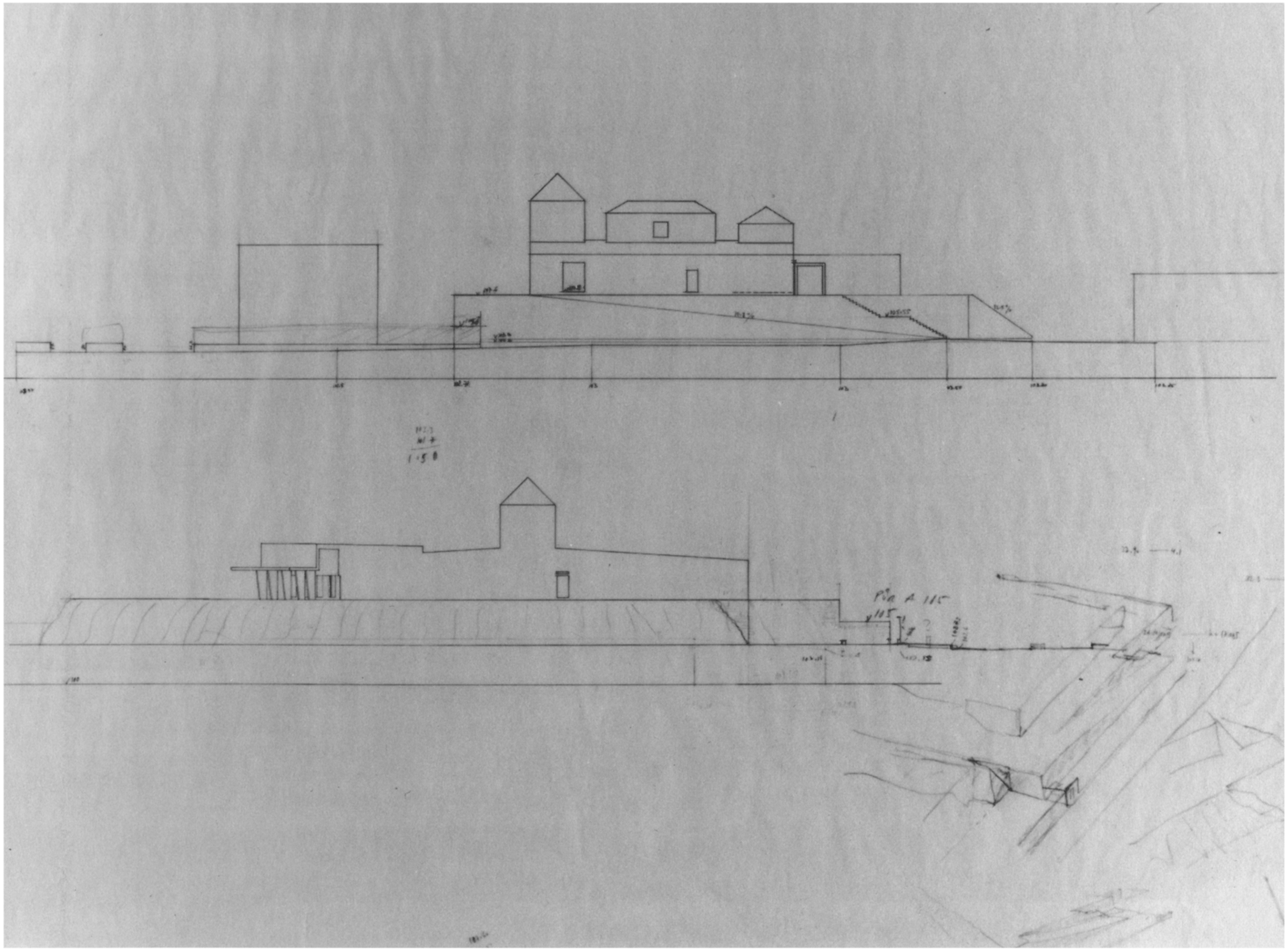

N
G.A.T.
2.800 m2
JARDIM ESCOLA JOÃO DE DEUS
3.870 m2
TRIBUNAL
4.500 m2
PORTO
E.N. 15
AMARANTE
ESCALA 1:200

68



69

series of investigative drawings. Figure 69 represents the first elevations drawn by Gates after the first talks with the engineer for what Siza calls "the internal process of information."

Before Siza even meets with the engineer and others in the firm, he does an initial series of sketches (figure 70). These are done, in Siza's word's, "to guide me through the initial processes of design."

After the conceptual stages are complete and the development phase is well under way, Siza does a series of drawings to test the ideas already decided upon. For example, figure 71 shows a conventional axonometric drawing done by Miguel Gates to test the roof.

After the development drawings are complete, Siza believes in producing a complete set of precise working drawings, even though in the project illustrated here the drawings could not readily be read by the builders constructing the project. Nonetheless, Siza believes that precise working drawings are essential to the design process if it is to produce a precise and well worked out design.

In Penafiel, since the builders in several instances were unable to read conventional working drawings, amended working drawings were also produced. As Siza explains: **A good builder could work from the working drawings but we needed to explain. On one working drawing [figure 72] there is an unusual axonometric on how to join the wood. We even made a model as template so they could build it. In another drawing [figure 73] the builder had a hard time reading it so we made an axonometric. Even in a drawing [figure 74] to show the carpenter where there is wood and ceramics for the flooring, we had to explain the design in words. In the end, many of these specification drawings we made for ourselves, to keep a record and to help explain the building. The Children's School in Penafiel is an example of using drawing to control the builders but having to move outside drawing or change the style of drawing to get the builders to work the way you want them to.** Drawing, for Siza, is about dialogue within oneself, with others in the firm, and with builders and clients: a dialogue in which the drawing is the key instrument of creation and control.

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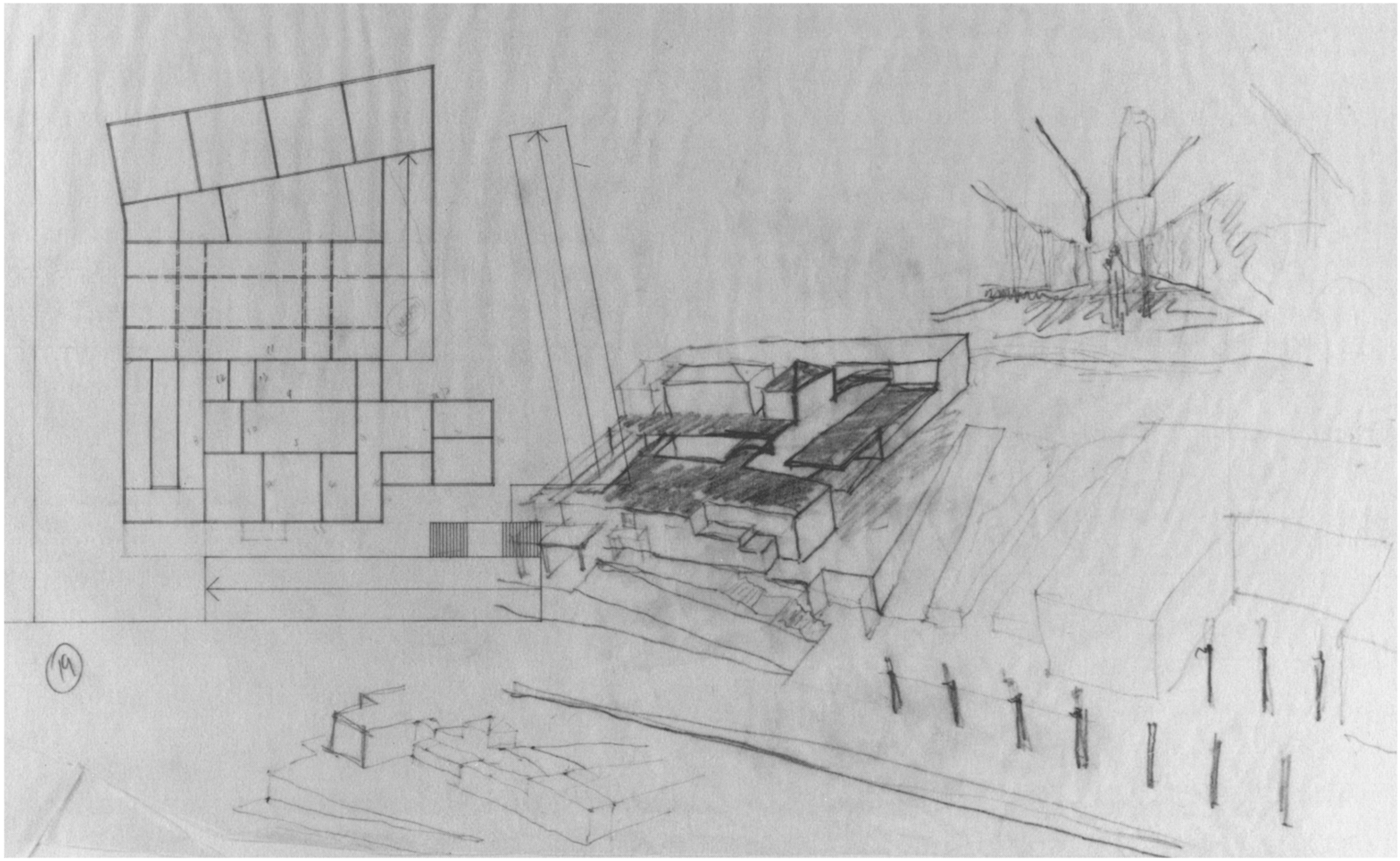
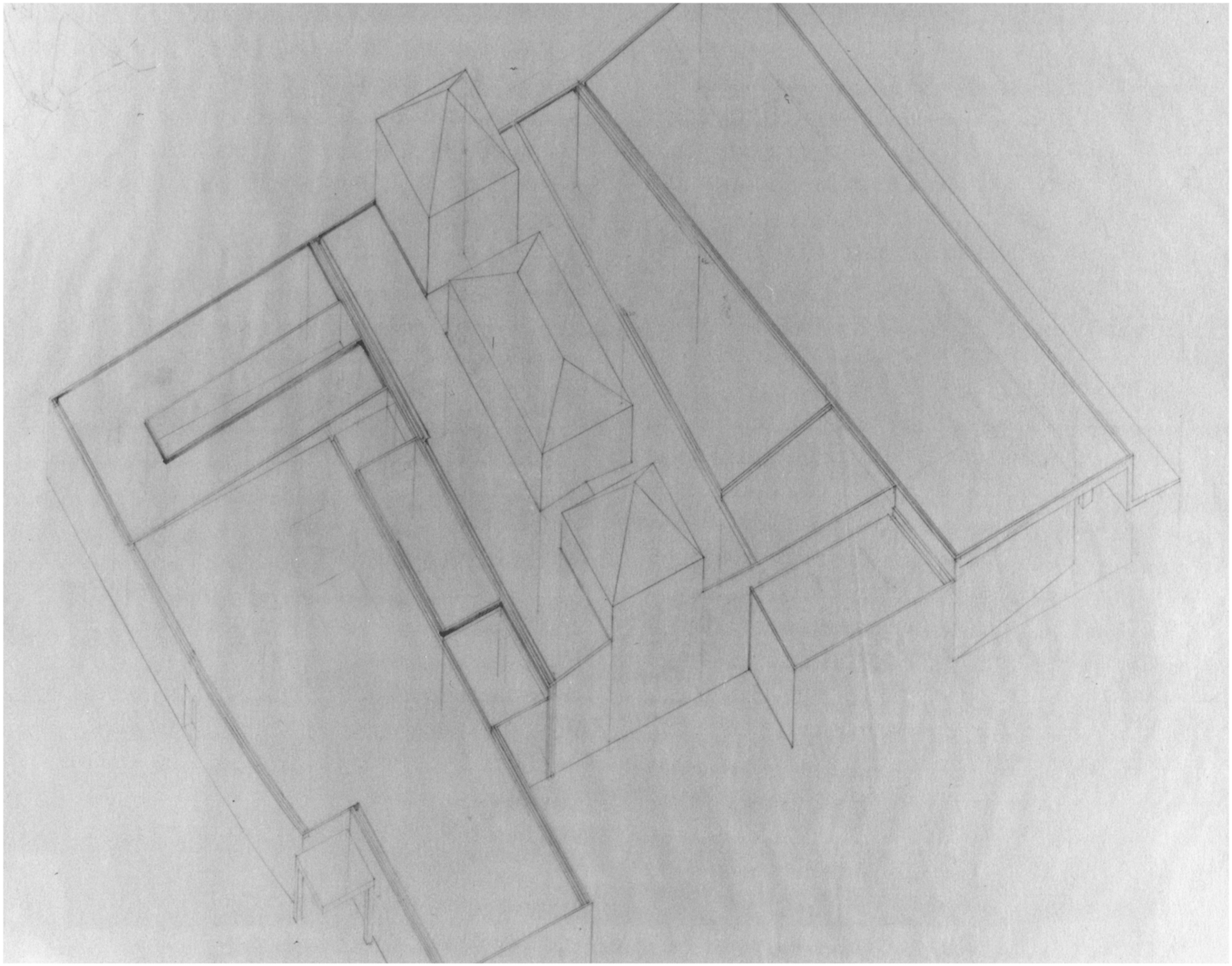
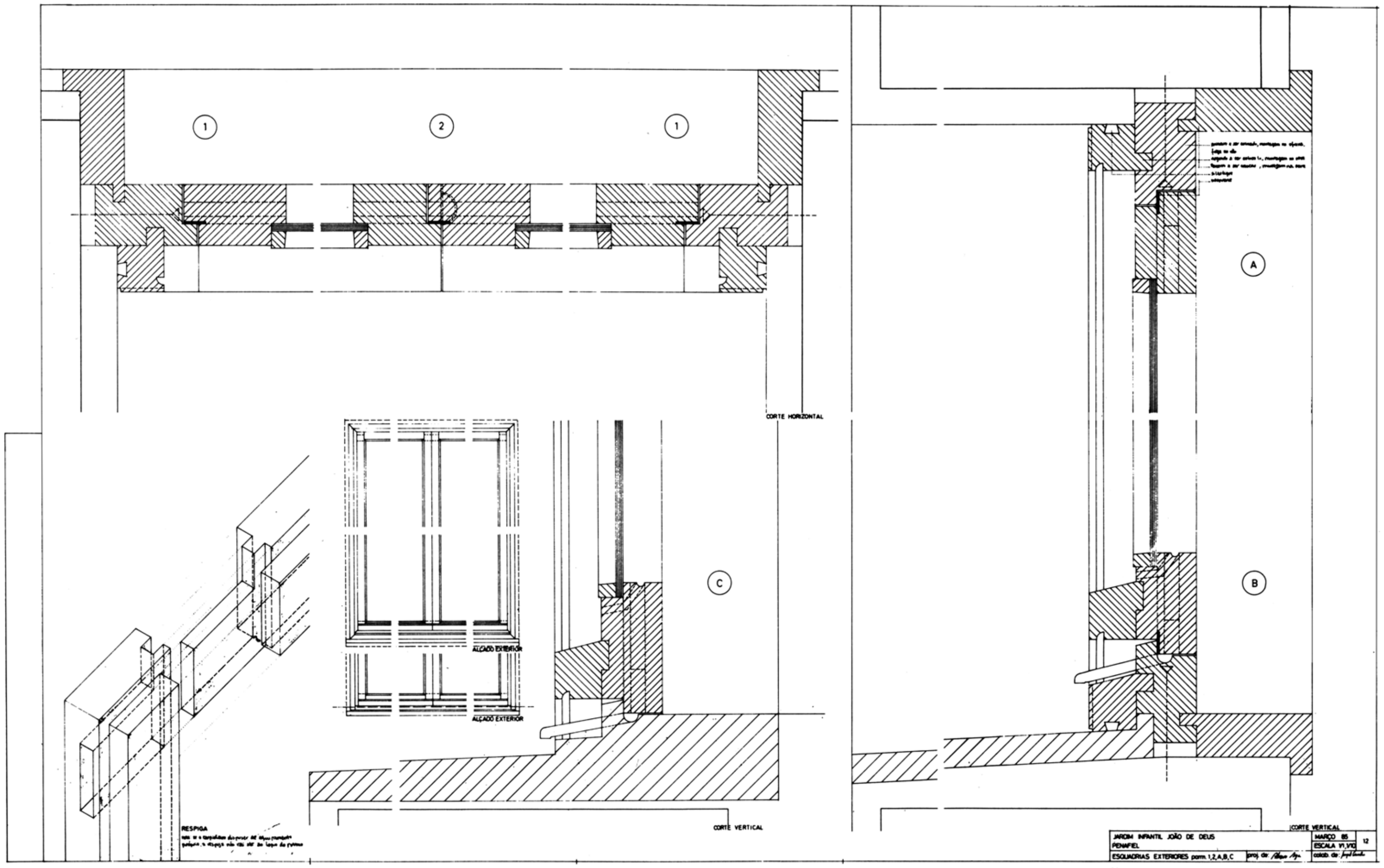
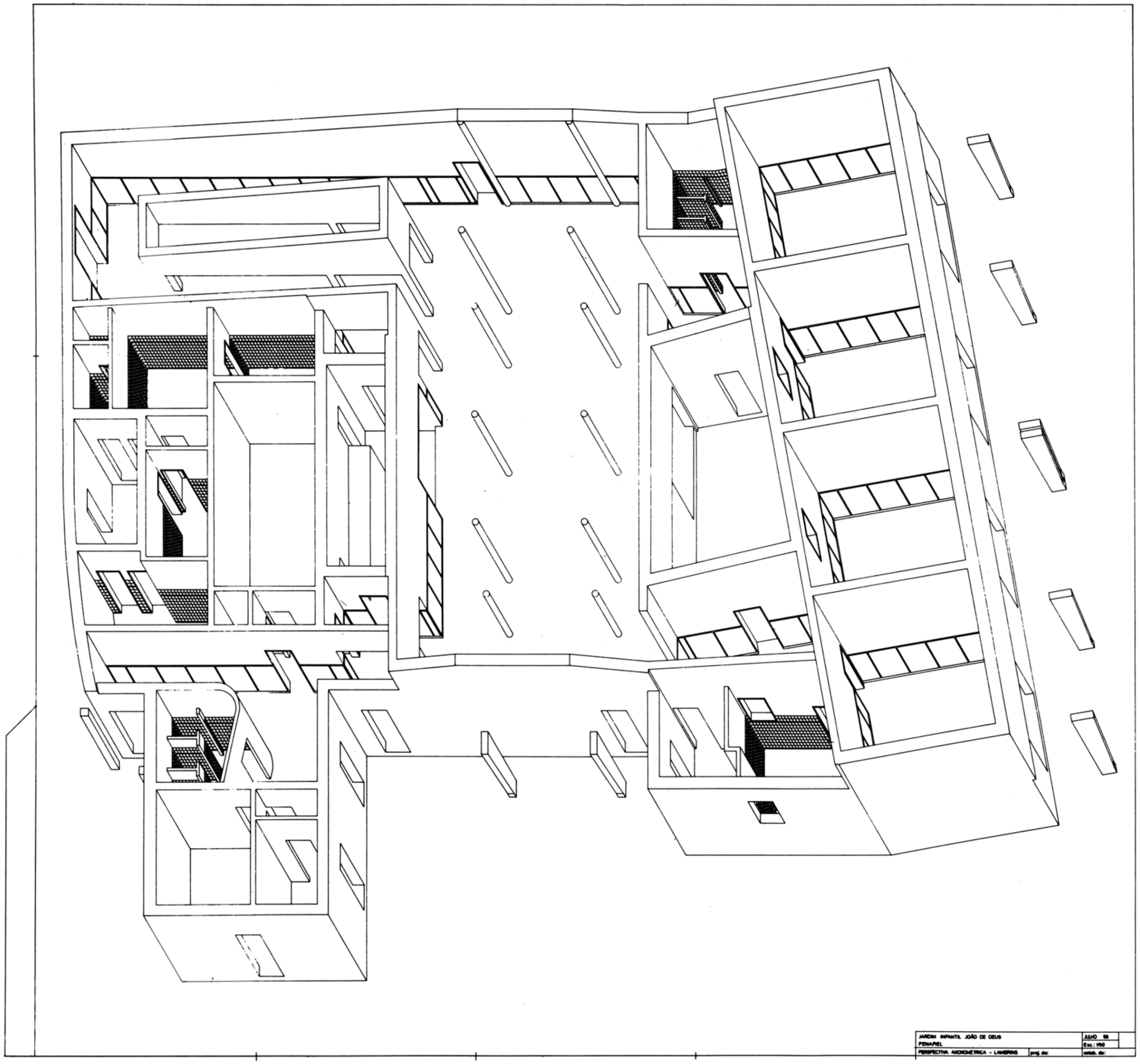


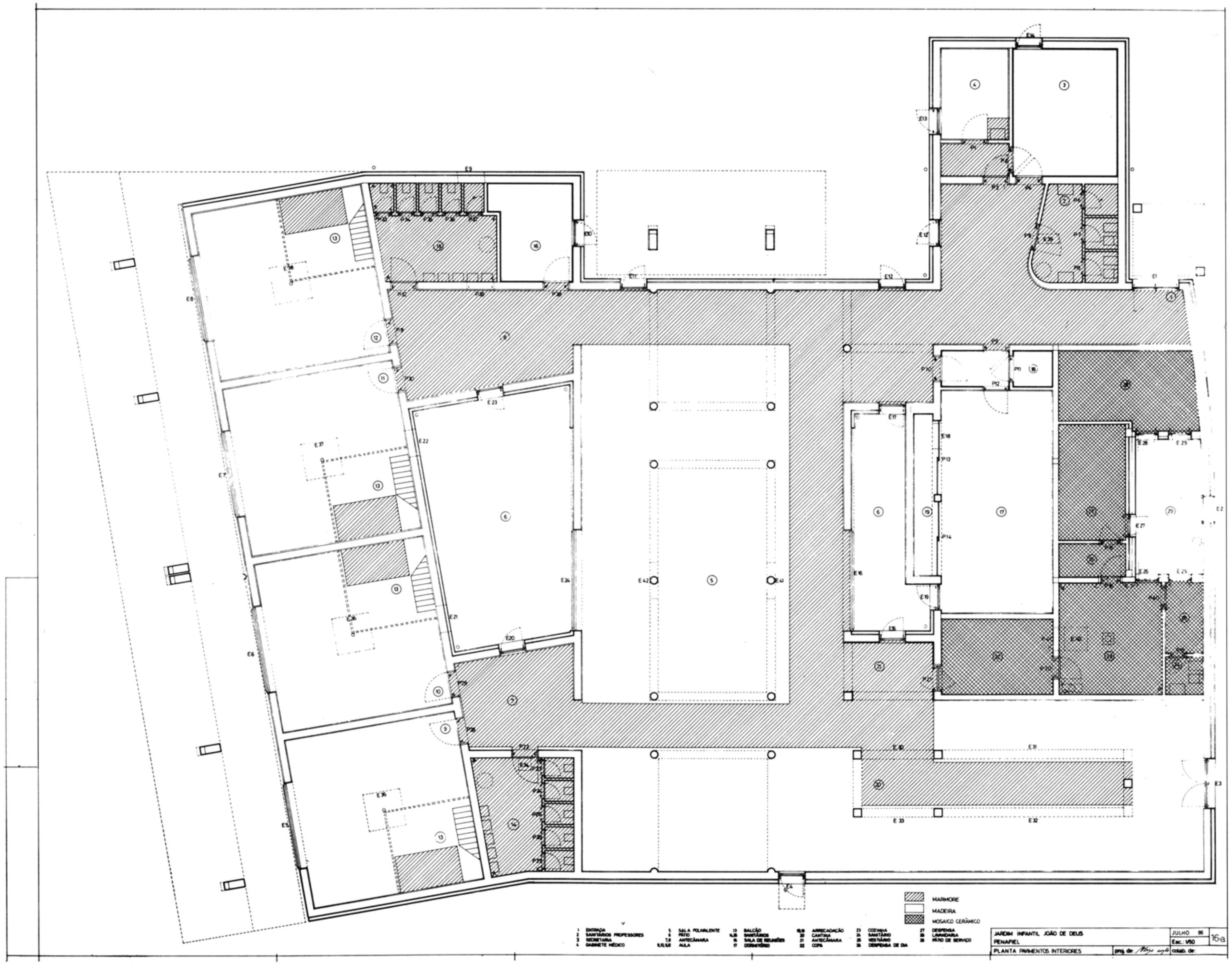



1
2
1
A
B
C
CORTE HORIZONTAL
ALÇADO EXTERIOR
ALÇADO EXTERIOR
CORTE VERTICAL
CORTE VERTICAL
RESPIGA
JARDIM INFANTIL JOÃO DE DEUS
PENAFIEL
ESQUADRIAS EXTERIORES porm. 1,2,A,B,C
proj. de:
MARÇO 85
ESCALA 1/1,1/10
12
colab. de:

72


JARDIM INFANTIL JOÃO DE DEUS
PENAFIEL
JULHO 86
Esc.: 1/50
PERSPECTIVA AXONOMETRICA - LAMBRINS
proj. de:
colab. de:

73


MARMORE
MADEIRA
MOSAICO CERÂMICO
1 ENTRADA
2 SANITÁRIOS PROFESSORES
3 SECRETARIA
4 GABINETE MÉDICO
5 SALA POLIVALENTE
6 PÁTIO
7,8 ANTECÂMARA
9,10,11,12 AULA
13 BALCÃO
14,15 SANITÁRIOS
16 SALA DE REUNIÕES
17 DORMITÓRIO
18,19 ARRECADAÇÃO
20 CANTINA
21 ANTECÂMARA
22 COPA
23 COZINHA
24 SANITÁRIO
25 VESTIÁRIO
26 DESPENSA DE DIA
27 DESPENSA
28 LAVANDARIA
29 PÁTIO DE SERVIÇO
JARDIM INFANTIL JOÃO DE DEUS
PENAFIEL
PLANTA PAVIMENTOS INTERIORES
proj. de:
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JULHO 86
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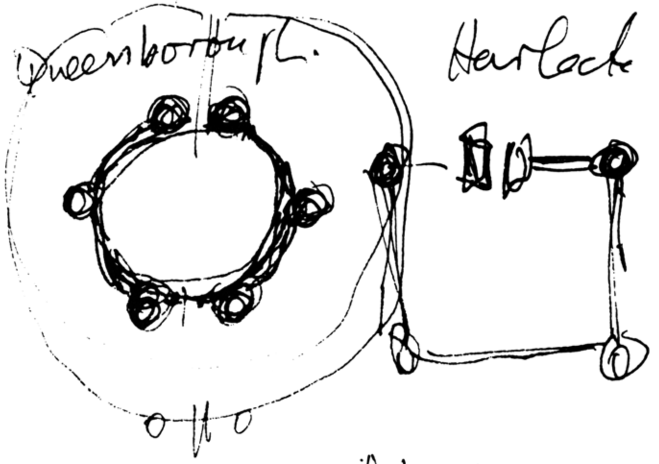
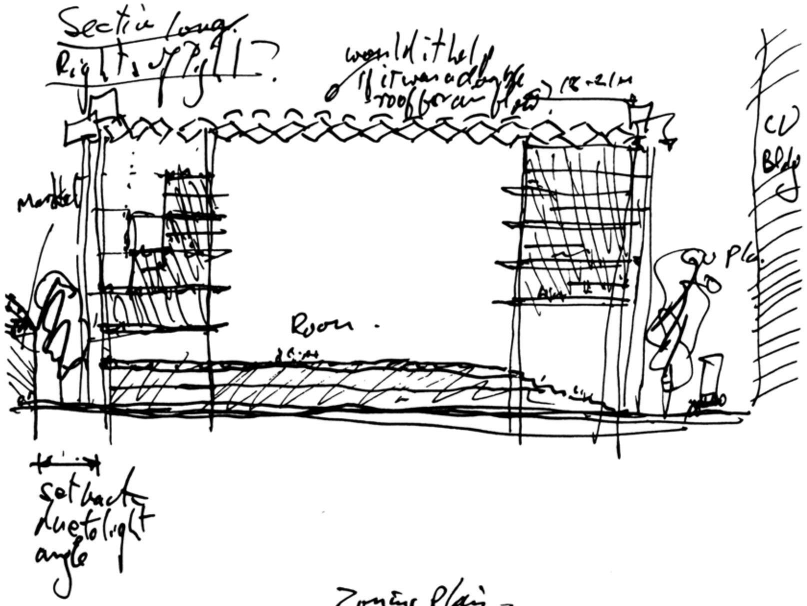
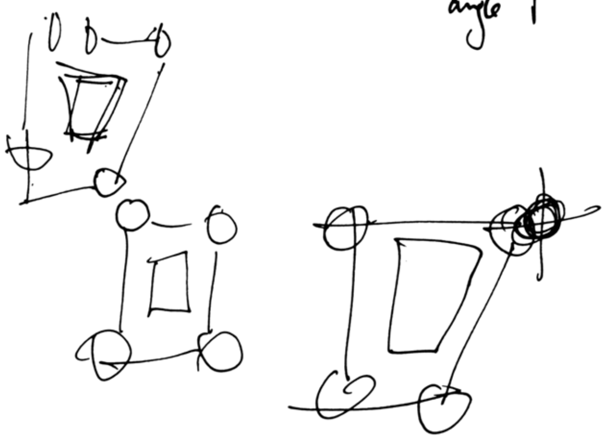
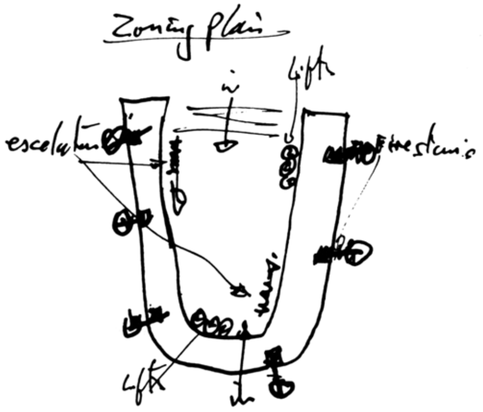
16-a


Queenborough Pl.
Havelock


Section long.
Rights of light?
would it help if it was a double roof for air flow?
18–21m
Market
Room
CV Bldg
Pl.
setback due to light angle




Zoning plan
in
lift
escalators
fire stairs
lift
in

John Young *The Richard Rogers Partnership*

John Young, a senior partner of the Richard Rogers Partnership, began the interview by showing a sketch by Rogers himself that became the basis for further discussion of the Lloyd's project then being undertaken by the firm: **It is a felt-tip sketch he had done over the weekend. It came in and was discussed with the team and people started to take that away, feed on it and draw it up, model it. With that we then had a basis for a meeting to take it further. But the thing that got the scheme on the road that shifted the scheme was that first little sketch that served as the basis for developing the scheme [figure 75].** For the firm of 70, Richard Rogers stands as the overarching figure whose early sketches and continued critical oversight of the design process are what makes the work what it is.

In the process of design, the office uses a range of drawings to conceptualize, present, develop, and realize its projects. For Young, each type of drawing has different uses and implications for design. Drawing should address not only technical values but also the implications its use has for clients and the extent to which the drawing captures the nature of the building it is meant to represent.

For example, sections are useful in developing a scheme, especially in relation to plan, but to clients sections appear to be too abstract: **For a client, it seems to be much more important for him to see the plan and understand the plan, but he is rarely able to understand the section.** Even with plans, clients often do not see the building as it is actually represented. Clients often accept what they see, but unless they are exceptionally experienced with design their understanding is more a measure of the verbal description than of the drawing.

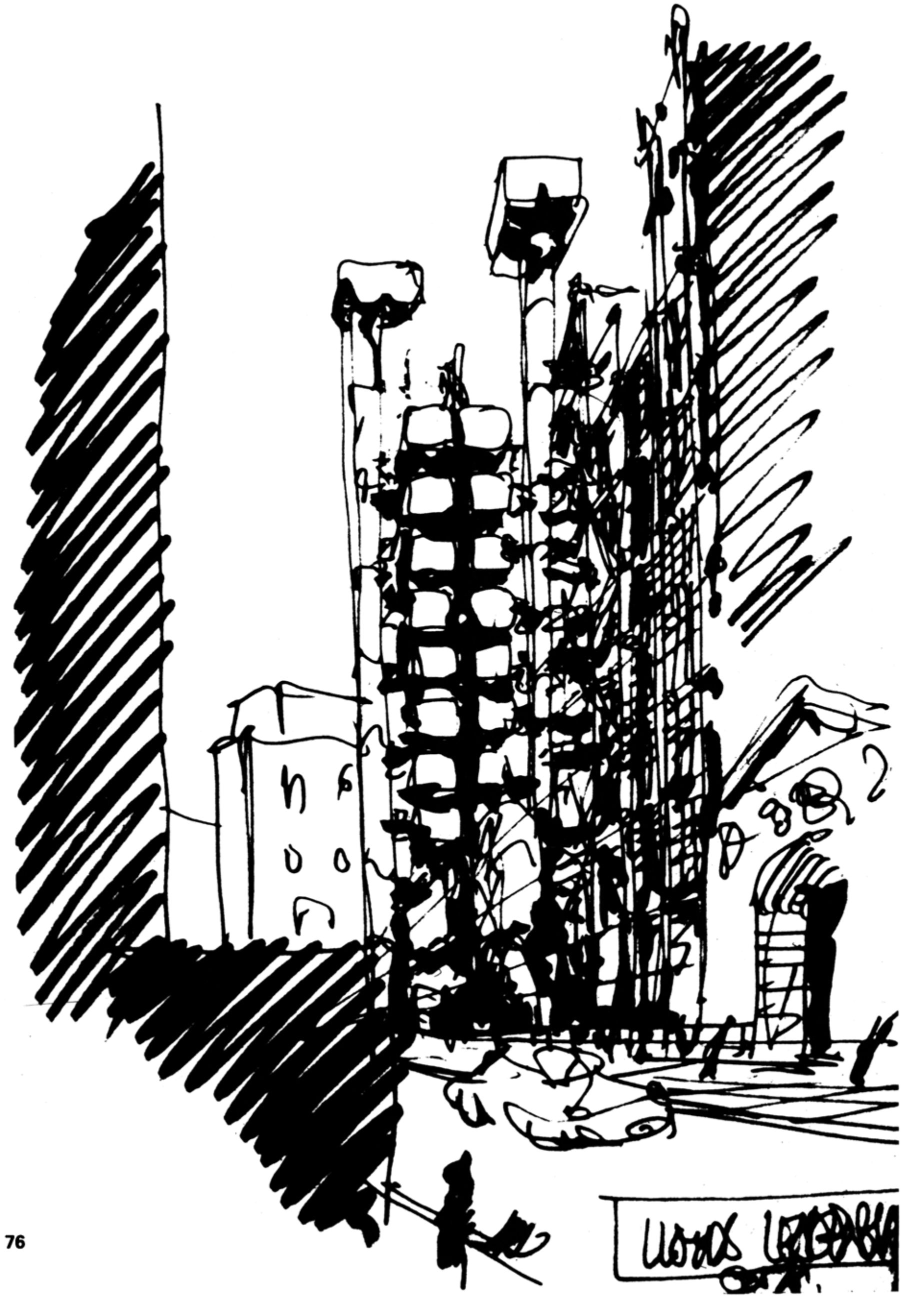
The drawing type that clients most often feel they understand is the elevation. For Young, this is problematic because the elevation when viewed by someone other than an architect can be misleading: **Unfortunately a form of drawing which seems to interest far too many clients too early on in the process is an elevation of what things look like. It is often the only thing a client can get a handle on and the only one he can express an opinion about, so we try very hard not to produce that kind of information too early.** While for the most part Rogers's office tries to avoid showing elevations at too early a stage, they are useful in some contexts. In some cases they are almost unavoidable: **Unfortunately, if one is doing a lot of speculative building, which is the way most building is being procured at the moment, and you're doing it for developers, and there is not much you can do on the fit-out role, elevations or treatment of the skin is what they are looking for in order to see what the building is going to look like. We would rather do a model.** An elevation of the Lloyd's Building, eventually hung at an exhibit of the project at the Royal Academy, is for Young an example of an elevation that, while not entirely forthcoming about what the building would be, was extremely useful in getting planning permission. While it was, according to Young, one of Rogers's favorite drawings, it did not capture Lloyd's: **This is where drawings can be used to, if you like, to cheat and deceive whereas a model can't. A color rendering was done by somebody in the office and it was done for a specific purpose which was to get the support of the planner.**

The building went into detailed design because although we had gotten planning consent for the building there were a number of what are called "reserve matters." The materials were not known at the planning stage because we were still working with wooden models. Also we still had not developed the treatment of the air distribution ducts and structure.

So when all the things came together we decided to do a soft drawing which gave all the information but was playing to the way they were interested in seeing the Lloyd's Building in the context of Leadenhall Street. And they loved it. . . . So that was an enormously important confidence-building drawing of a type that has only been done once in this office. It was done for a purpose and was 100 percent successful. . . . It allowed the project to then advance and build up its momentum to the point it got built. In the same way that Young is suspicious of three-dimensional perspectives, he has come to be equally suspicious of elevations. When shown to a client they hide too much and also often do not reveal what is important about a building.

Axonometrics are often used by the firm at early stages of a design to get a sense of the space and to get command over the concept of the building. At Lloyd's, one of the critical early sketches was an axonometric as a notional drawing of how the plant could be understood.

What Young feels it is important to understand is that drawing in the practice is an evolving activity. For example, as the firm grows, there is more reliance on soft felt-tip pen drawings, as in the early sketch of Laurie Abbott (figure 76), than on hard-line drawings, like that of Alan Stanton (figure 77), to develop a scheme and to move it forward. These drawings are also useful to help most clients think about the project. Most important, these forms of drawing have allowed the firm to keep up with the changing demands of the architectural world. Soft felt-tip pen drawings **are for the firm itself a way to develop something and shift something forward. They are also a way of moving a scheme through very quickly because very few of the jobs we have at the moment have the generous design time that Lloyd's allowed us. Everything now is much faster. . . . One of the things I lament is the very short design time being allowed for a number of projects before they hit the site. One is also tailoring techniques for developing ideas, presenting ideas, where one can telescope the design process into shorter time frames. So one is relying more extensively on felt-tip pen drawings, doing one plan and tracing off it with variations, etc., and**



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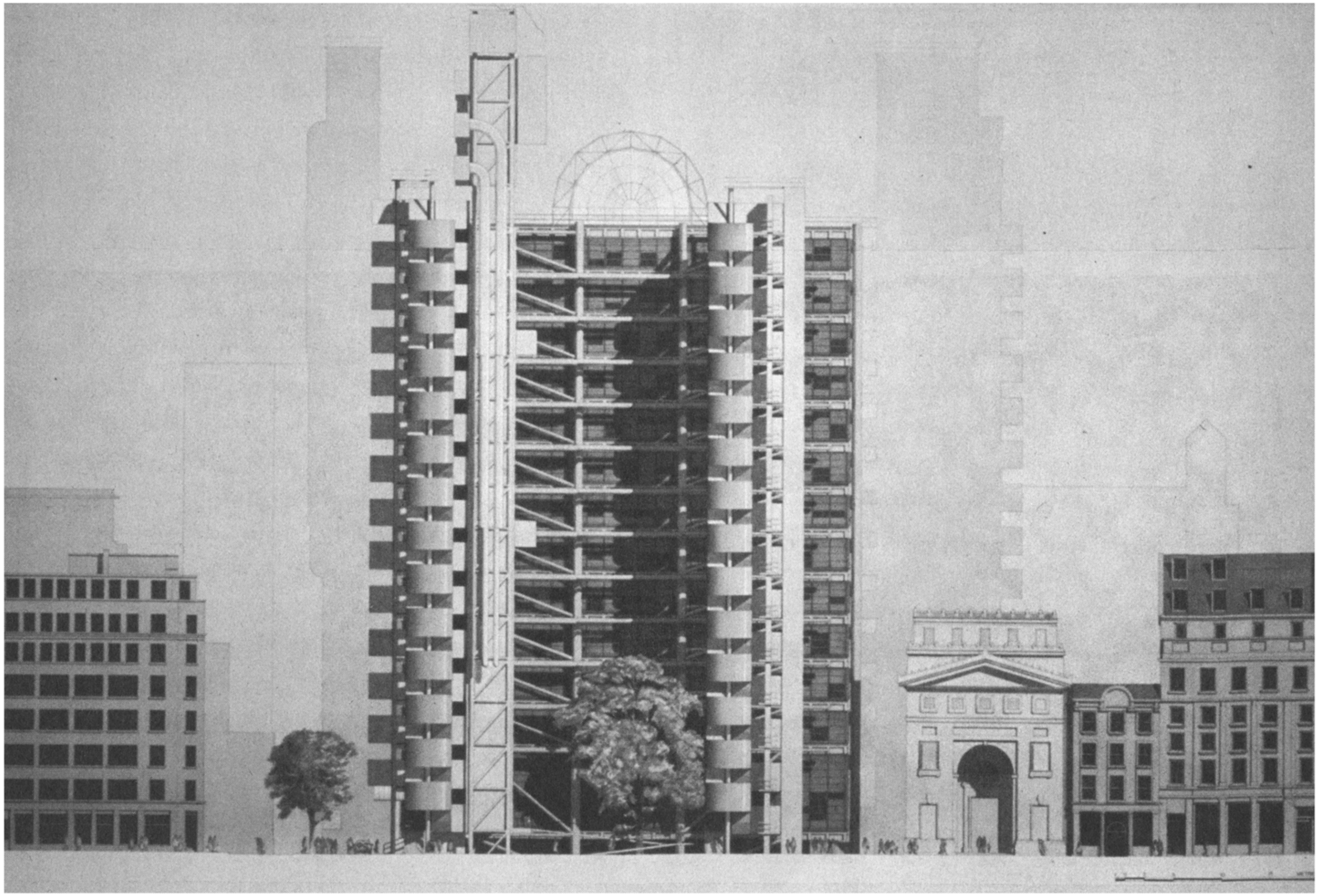

John Young *The Richard Rogers Partnership*

using that to develop the design and to present it as well in many cases. While there are limits to this new form of practice and of drawing, Young sees some advantages as well. The shift to a more rapid design process has also meant, in cases where the client is especially involved and by nature more professional and competent, a shift to a more informal process of presentation and interaction: **What we enjoy more, and is happening more now, brought about partly by the speed with which things are having to move, are less formal situations, where the design is developed with the client during the presentation . . . and it is moved toward the next stage.** Although the practice is informal by nature, the drawings presented to a client are still very much tailored to that client's needs. In the Lloyd's project, the process was rather more formal than less. Traditional presentations to the client's steering group were given after the architects had presented the design to middle management for a kind of dry run. **Right from early on, it was quite clear that they [the client] were going to be dealing with quite a fundamentally different building. One was quite careful not to run before you could walk with the drawings that we would use.** Thus the use of drawing with clients varies somewhat and is made more or less complex depending on the client and that client's ability and desire to work within the design process.

The new forms of practice and the size and number of projects have forced the Rogers office to rethink the structure of their approach. To Young, their firm differs from that of what he calls the "complete architect," like, for example, Renzo Piano, with whom Young has worked and who, according to Young, takes the brief, does the sketches, and is involved in all the stages of the design. In the Rogers office, things are less centralized. Control of the process of design is first ceded to a project head, usually a director (of whom there are nine in total) or senior architect, but final control is vested in the group of founder partners who meet each Monday to critique the work done by the various groups. The critique has the form of a typical studio crit in school. This process, Young argues, has become more and more critical to the control of the design output for which the practice has gained its reputation in the first place, as the lead time for designs has become shorter.

Each partner, though, is responsible for his project and works with a team of architects. Of the four senior partners only Mike Davies does much drawing, except for small suggestive sketches used to move a project along. Rogers himself rarely draws but acts as the key critic, especially in the early stages of conception and development. Often the early sketches of a partner are the result of meetings with a client.

The move away from drawing by partners has been a result of the growth of the office. Young recalls the early stages of the practice when he drew a great deal, noting that he went into architecture because he loved to draw:

My father was an artist and taught art. It was because of my artistic abilities that I went into architecture. . . . When I joined Richard in 1966, it was Richard plus Norman Foster and their wives and one other. I did virtually all the drawings between 1966 and the early 1970s until the Pompidou Center when the office took off. And now the kind of sketches you see here or you've seen in my notebooks [figure 78], that is the level of drawing I use to develop ideas. While the partners draw less, junior colleagues with a few exceptions generally work from the conceptual sketches of the partners. The shift has meant that more junior colleagues have had a profound effect on the mode of drawing within the firm. This happened when Young, who had been central to most drawing in the early days of the practice, "met his match" in Richard Soundy, who could draw as well as Young but four times faster in Young's estimation.

For the most part, junior colleagues work off of and develop sketches done by the partners, with the exception of what Young calls the key "design drawer" in the firm. This junior colleague can have a profound influence not so much on the conceptual formation of the architectural idea but on the way it is represented and then thought through in drawing: **And now probably Graham Stirk of the new generation along with Laurie Abbot of the Team 4/Pompidou Center lineage . . . [is] the most important design drawer in the firm—the most important of the young designers who works closely with us, the senior directors, and then takes a design through. In fact, he has been as responsible as anyone for changing the drawings we do in this office to a much looser, softer style.** Not only has the office changed its way of using drawing internally, it has also reframed how it works with engineers, in particular Peter Rice of Ove Arup when he was alive. His ability to read drawings and understand design from first principles enabled the firm to include him at the earliest of conceptual stages in the process of design. While Rice did not draw much himself, if at all, he had an overall vision for a project in the way Rogers has and was able to **see abstract conceptual sketches and work very closely [with them], whereas a lot of engineers can't. They can't make a useful contribution until later in the design process.** This unusual role for an engineer has resulted, according to Young, in buildings that are different. The structure now feels and looks less like something grafted onto the building.

As Rice worked with the office over the years, it enabled him to work as the partners work with each other, through a kind of verbal and visual shorthand: **Because of the special relationship we have with Peter, any material we are producing—thumbnail sketches, anything that is coming out—he is a party to. Peter is used to working from scraps, anything we give him. The founding partners have a shorthand among themselves which is some-**

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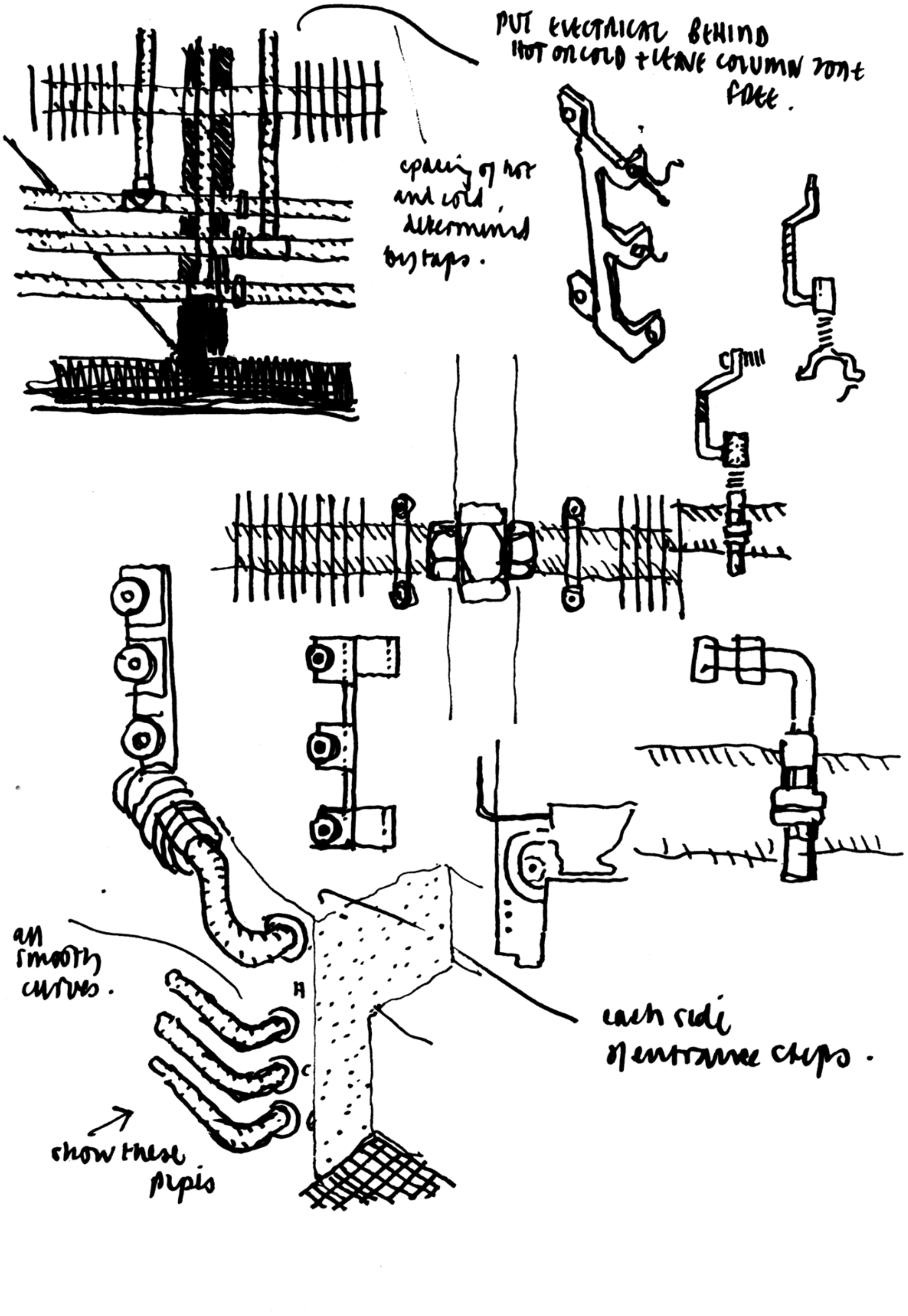


PUT ELECTRICAL BEHIND HOT OR COLD + LEAVE COLUMN JOINT FREE.

spacing of hot and cold, determined by taps.

each side of entrance clips.

all smooth curves.

show these pipes

times lost on some of the guys who haven't been with us a long time. . . . Richard and I because we have worked together for so long know exactly what we mean. We have that same shorthand with Peter . . . who is also able to work with the most minimal information. Young sees this as different from the way many firms work with engineers, whereby the architects first develop the conceptual scheme and then give it to an engineer who must find a structural means to realize the design concept.

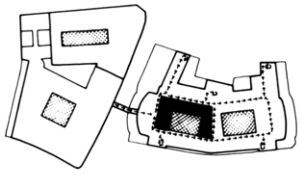
If the Rogers office works in a somewhat unusual way with engineers, its use of drawing with quantity surveyors is more typical: **The cost guys are the most difficult. They need a specific kind of information and find it terribly disorienting to be fed through sketches because they can't measure a sketch.**

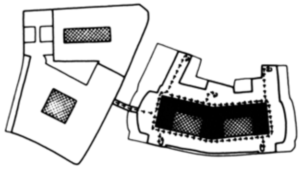
Because the Rogers firm is internationally renowned, its sense of public image creates a special problem when it comes to presenting itself to the public through drawing. Drawing, because it is so often published, is critical, Young argues, to the public's understanding of the office's work. At times, projects that should have received more public attention have failed to because, according to Young, the drawings representing the projects have been lacking in clarity or quality: **We are perceived by the public at large as two-hit wonders. We've done two controversial buildings: Pompidou Center and Lloyd's. But there is a whole body of work spanning twenty-odd years that is not generally known. The conversion of Billingsgate is going hopefully to dispel that. Here is something that is totally untypical of the Rogers office: to actually take a historic building and restore it as closely as possible to the intentions of its original architect but to add some modern elements entirely Rogers to bring it up to date. . . . Curiously enough, that should have been an absolutely golden opportunity for producing some very beautiful drawings, but I think that some of the least inspiring drawings we have done in this office have been on that project and I don't know why. And the press coverage has been disappointing as a consequence.**

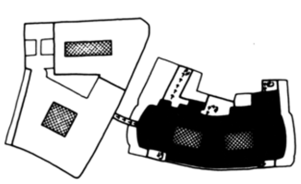
If Lloyd's, for Young, does not accurately represent the totality of the office's work, it does represent a critical juncture in the development of the office's use of drawing in its design process: **Lloyd's was a milestone for this practice. First of all, it was a hand-drawn, hand-crafted project. Every drawing was done by hand in this office. There were a lot of repeats in the building, so in a way it was, except for some fancy detailing, tailor-made for CAD, but we did not have CAD at the time. It's an investment we have made since. So I see Lloyd's almost as a dodo. Some fabulous drawings were produced, fabulous production drawings but it was hand-crafted. It's almost the end of an era because today if we were doing it again they would be done on a CAD system. Lloyd's would be an ideal vehicle for a CAD-based project, par-**

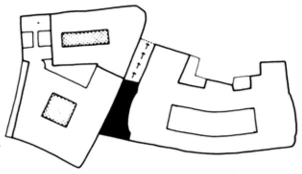
ticularly for the structure/services coordination. What is also critical to understand about the Lloyd's design, Young argues, is the process of analysis that underlay it. Rather than developing evocative and seductive conceptual drawings early, the office instead worked to produce a whole set of analytical drawings that the clients could use in understanding what was needed and what type of design was most appropriate for those needs: **What put this practice on the map was, in those early days, this terrific concentration on analysis of a problem. Problem solving was at the root of our development . . . deliberately resisting finite solutions until a whole range of options had been explored and analyzed.** This approach still is central to the Rogers office today. It was a central part of the attraction the office had for Lloyd's and demonstrated, for Young, the importance of a lengthy and complete analysis of the problem at the outset: **I often get asked how on earth did you persuade a conservative client like Lloyd's to accept such a revolutionary building? And the answer is you don't take the brief and then disappear into your studio and then meet the client with a whole set of drawings, perspectives, and models and say "there it is"—we would have been fired. The committee made it quite clear when we were appointed by Lloyd's that they didn't like the Pompidou Center but they came to us because we had demonstrated an analytical approach, a revolutionary approach, and that we could build on time and on budget in a complicated urban setting.** For Young this has a lot to do with drawing, because the approach to the Lloyd's competition did not involve the production of a whole set of conceptual drawings but instead a set of analytic and diagrammatic sketches that laid out a set of options for the client, options that dealt with their problems rather than with an image or single overarching idea for the project: **We won the competition with virtually no hint at a possible design for the building, but instead proved to Lloyd's through patient analysis that we understood their problems of growth and change in a volatile market better than Lloyd's themselves did.**

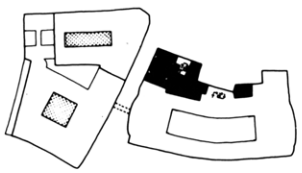
The Lloyd's project reveals for Young what he sees as the office's approach to both design and the use of drawing in design. When the final competition report was sent to Lloyd's, it had a whole discussion of their needs and problems and only a few diagrammatic sketches that laid out a set of alternative approaches. **The key page in the competition report [figure 79] showed their two sites with 21 different ways in which the site could be developed and how the development could be phased.** The resulting design was produced in a way that did not surprise the client: **So by this careful process of analysis, drawings, and analytical diagrams you actually get something like the built form because you have been through the process with them, taken them with you, agreed point by point at meetings and then get to a stage and say**

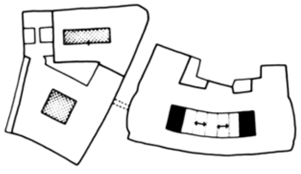


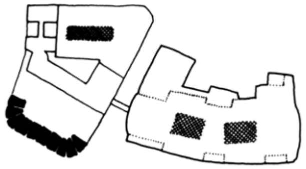


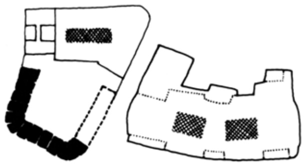


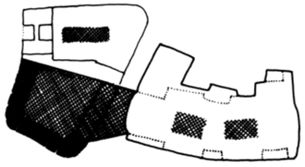


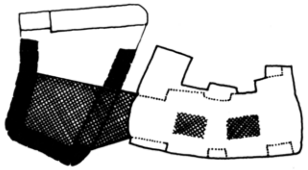


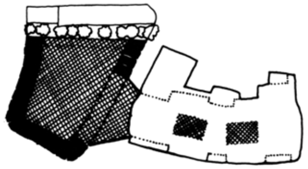


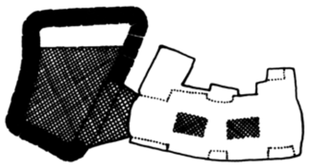


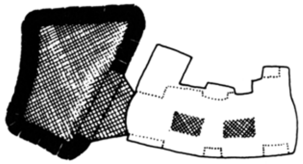


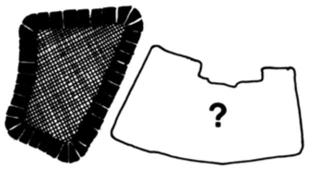


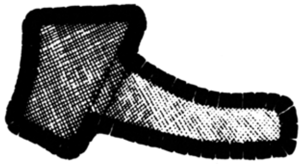


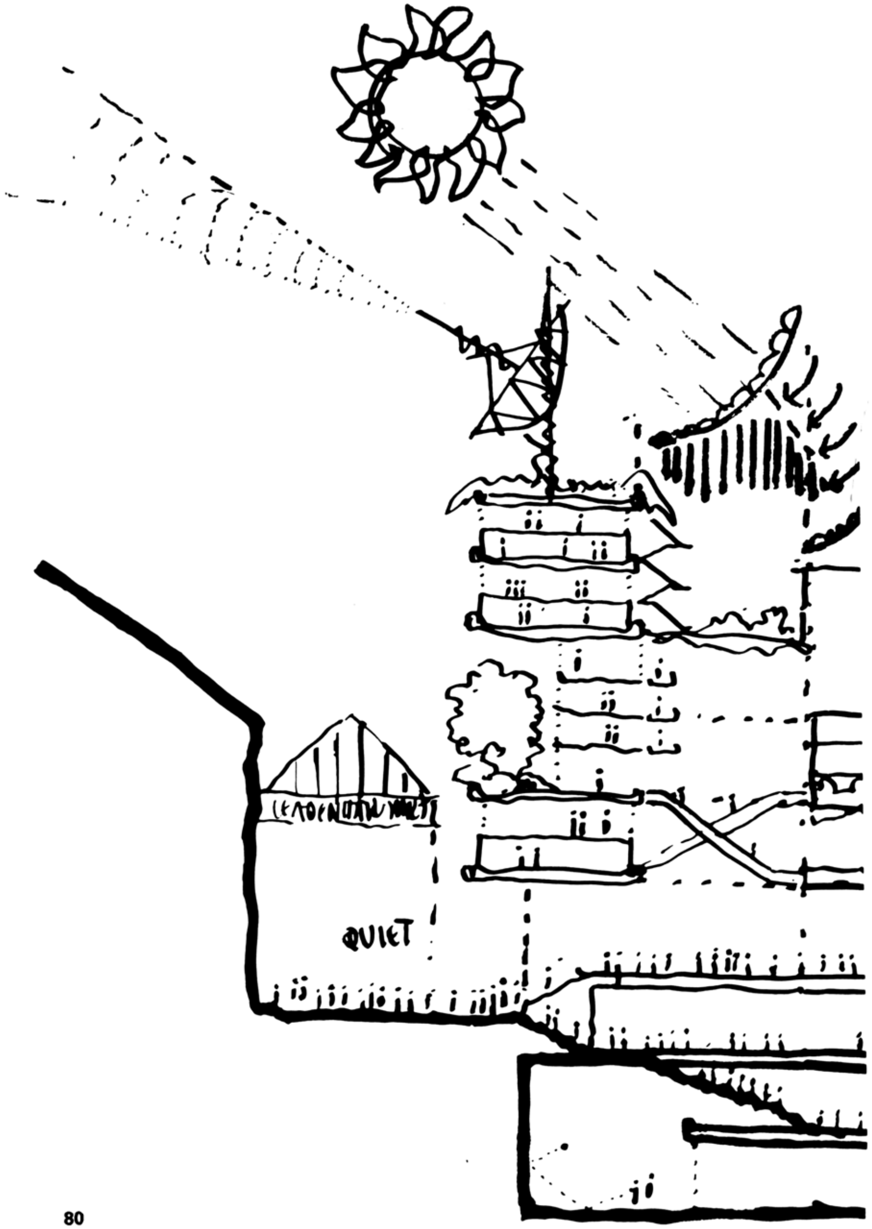










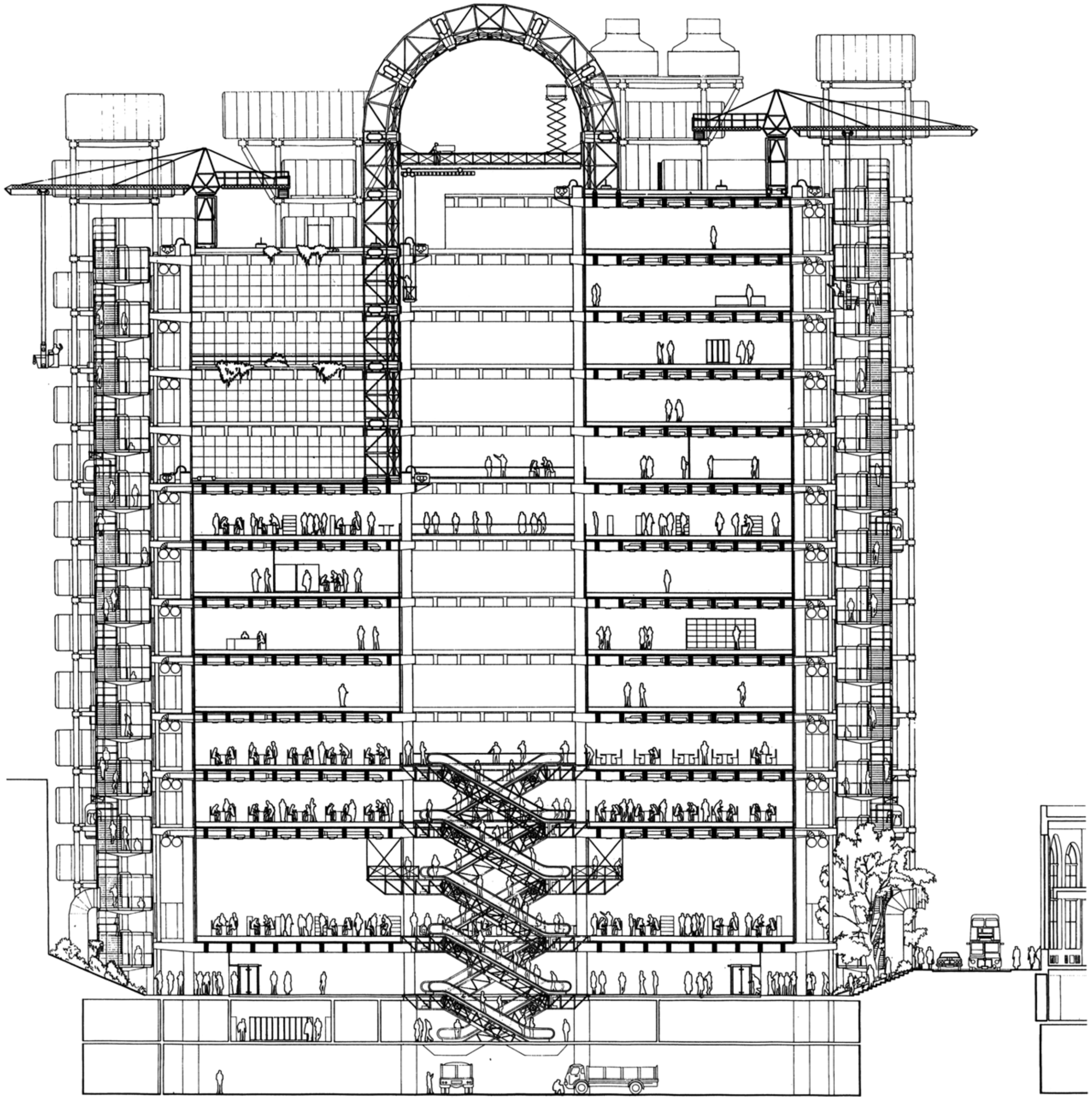

LEADENHALL MARKET
QUIET

"now let's pull all this together as a building." What a project the size of Lloyd's also teaches us about drawing, according to Young, is that the partners like Young who managed the project need to draw through others as they themselves have little time to work on development and realization drawings. The need to guide others through small detail sketches that are then put into a drawing Young finds both satisfying and most efficient: **Actually sitting down with one of the guys and just sketching what one wants from the detail and then seeing it take form on a drawing, I find immensely satisfying. It has to happen because there is just no time for me to do the drawings but one's output is so much higher because one is working with so many people simultaneously. I never thought I would find this work so pleasurable and that actual drawings would be an almost zero occupation at this stage of my career, when it had been the prime mover for architecture as my chosen career in the first place.** For Young and the Rogers office, the size of the firm and the magnitude of their projects along with their specific approach have shifted the role of drawing onto juniors in the office, guided by sets of detailed analytic sketches from the partners. The process of design becomes a group endeavor. The drawing as sketch and as a form of presentation, both within the firm, in their Monday crits, and to the client, becomes part of the very process of design.

The Lloyd's project was itself the result of a number of drawings produced over an eight-year period by a number of actors working on the project. Figure 80 was an initial concept sketch for the competition report to the client, drawn by John Young in April 1978, setting out the environmental responses of the design. This report described the project in words and drawings and included a whole series of development options drawn by a number of people in the Rogers office.

As the work proceeded, Richard Soundy drew a number of collage sketches in 1979 of the early massing studies of the building to assist the city planners with their own understanding of the project and how it would work in relation to the City of London's skyline. Additional sketches were made by Laurie Abbott around the same time to understand the relation of Lloyd's to the street, in order to see how this contemporary design would fit with its Victorian context (see figures 76 and 77).

After the initial conception for the project was produced, a whole series of developmental studies were undertaken to better understand how the building would work. Figure 81, a section through the building between Green Yard and Lime Street by Kieran Breen, was done around 1980 and was used along with a number of other drawings to get a better understanding of the context and building relationship.



81

A major issue throughout the development of the project was the design of the atrium and its relation to the whole. A series of development drawings were produced. For example, the drawing in figure 82, by Richard Soundy, was produced in 1982 to study the atrium structure and its connection to the main structural frame. The drawing by Mike Elkan used to evolve the atrium access systems (figure 83), done in 1984, reveals the time it took to finally develop the complex connections in the building.

By 1985, the design work had come to the point that the actual relations and uses of the building were understood. An example is an axonometric by Stephen Tsang (figure 84) that demonstrates the space utilization of the ground-floor underwriting room facilities of Lloyd's.

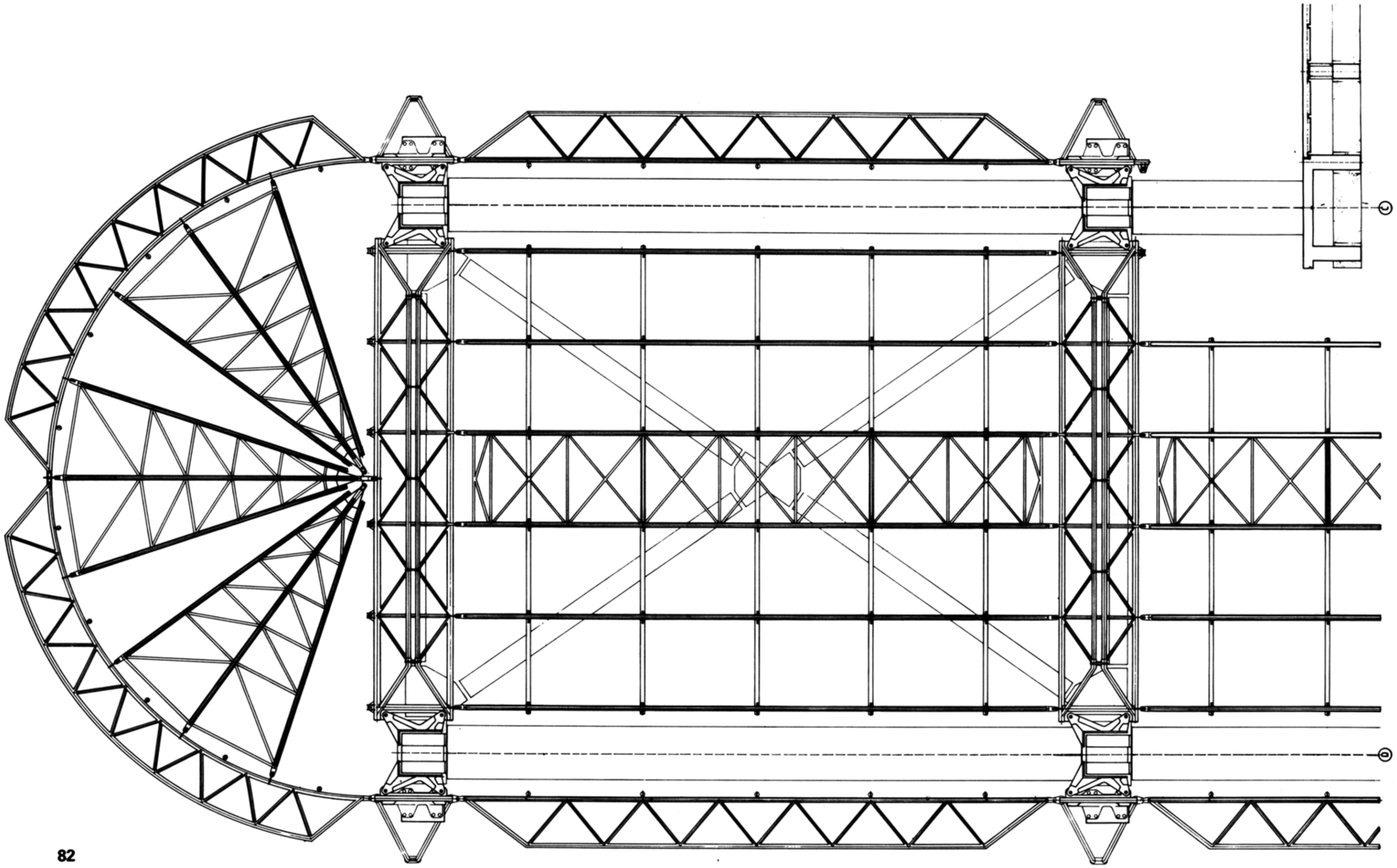
By 1985, final presentation drawings of the detailed part of the building were being shown to the client, as in the drawing (figure 85) of the principal satellite at the corner of Leadenhall Street and Lime Street by Josh Wilson and Philip Gumuchdjian showing the final proposal for the barrel-vaulted glass entrance canopy.

The study of the information towers, located throughout the underwriting rooms, by Amarjit Kalsi in 1985 (figure 86), reveals that even as the final presentation drawings were being readied for parts of the design, further studies of the building design were proceeding apace.

In parallel with the work being done by the members of the design team, John Young kept on top of the project through constant overseeing and sketch suggestions, as in the sketch drawn in August 1985 (figure 87) to investigate a "Lloyd's Clock" mounted in the tower—a suggestion eventually abandoned. The partners in general kept abreast of the project through weekly project reviews of the drawings.

Finally, when the design was complete the office had a line drawing produced by Ron Sandford (figure 88) to show the building in context, for a special presentation book to commemorate the building's opening designed by Alan Fletcher of Pentagram in 1986.

Always under the gaze of the partners, who sometimes sketched and sometimes juried the work in progress, Lloyd's is the result of a long period of design and production in which drawing was involved with everything from conception through management of the office to communication with and persuasion of the client and the planning authorities to the technical development and realization of the design.



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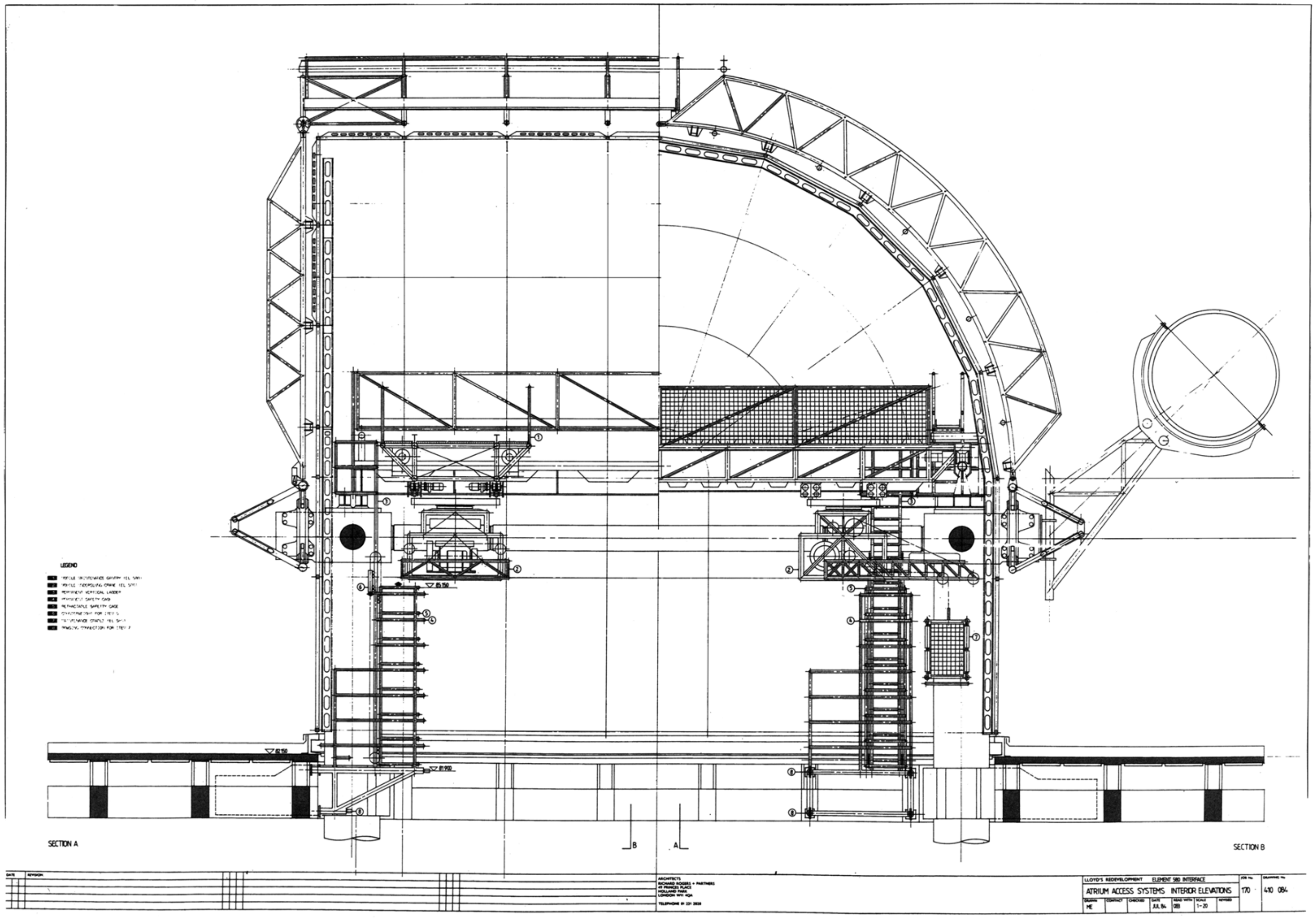
LEGEND
1 MOBILE MAINTENANCE GANTRY (EL 5??)
2 MOBILE TELESCOPING CRANE (EL 5??)
3 PERMANENT VERTICAL LADDER
4 PERMANENT SAFETY CAGE
5 RETRACTABLE SAFETY CAGE
6 COUNTERWEIGHT FOR ITEM 5
7 MAINTENANCE CRADLE (EL 5??)
8 HINGING CONNECTION FOR ITEM 7
SECTION A
B
A
SECTION B
DATE
REVISION
ARCHITECTS
RICHARD ROGERS + PARTNERS
49 PRINCES PLACE
HOLLAND PARK
LONDON W11 4QA
TELEPHONE 01 221 2828
LLOYD'S REDEVELOPMENT
ELEMENT 580 INTERFACE
ATRIUM ACCESS SYSTEMS INTERIOR ELEVATIONS
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170
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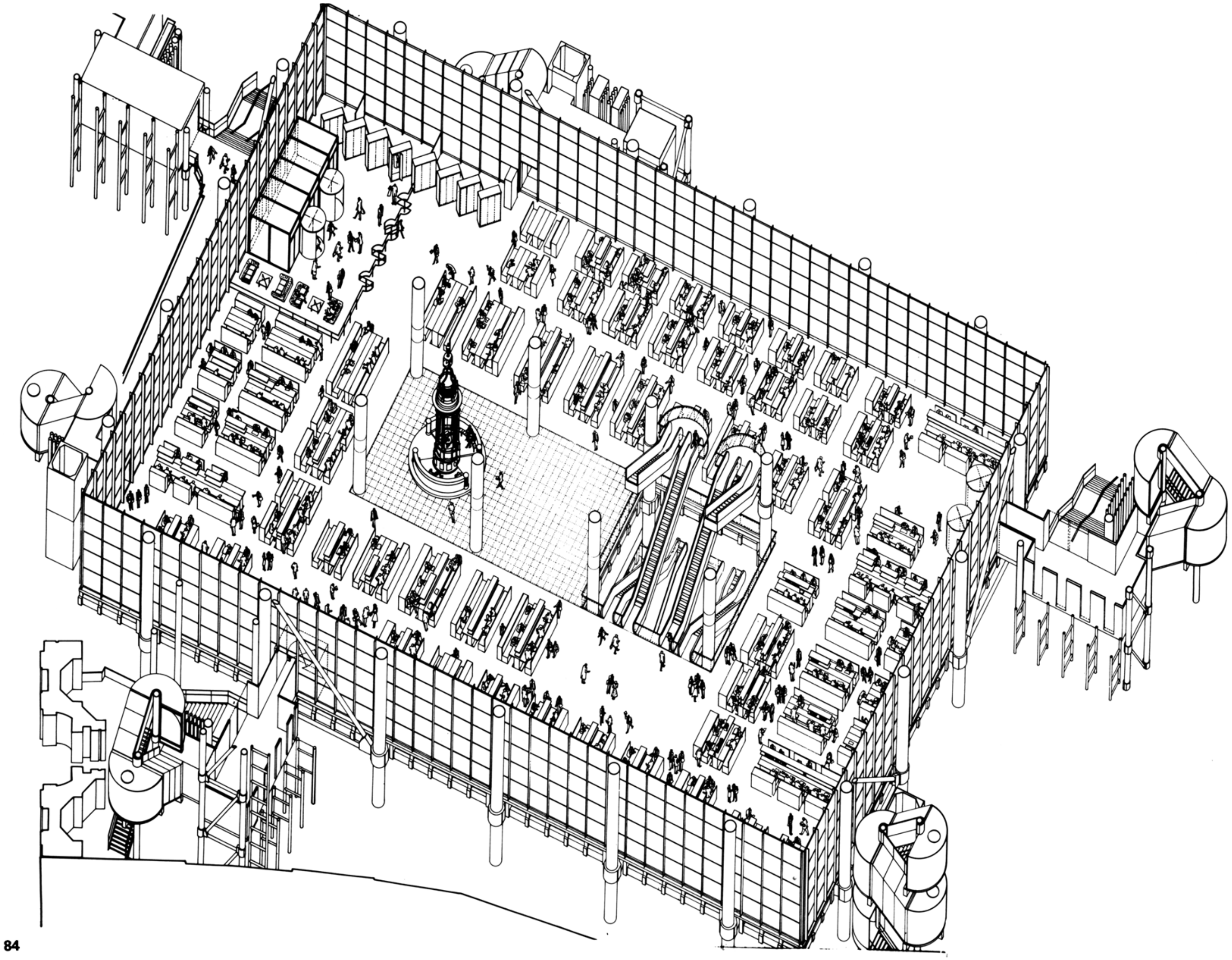
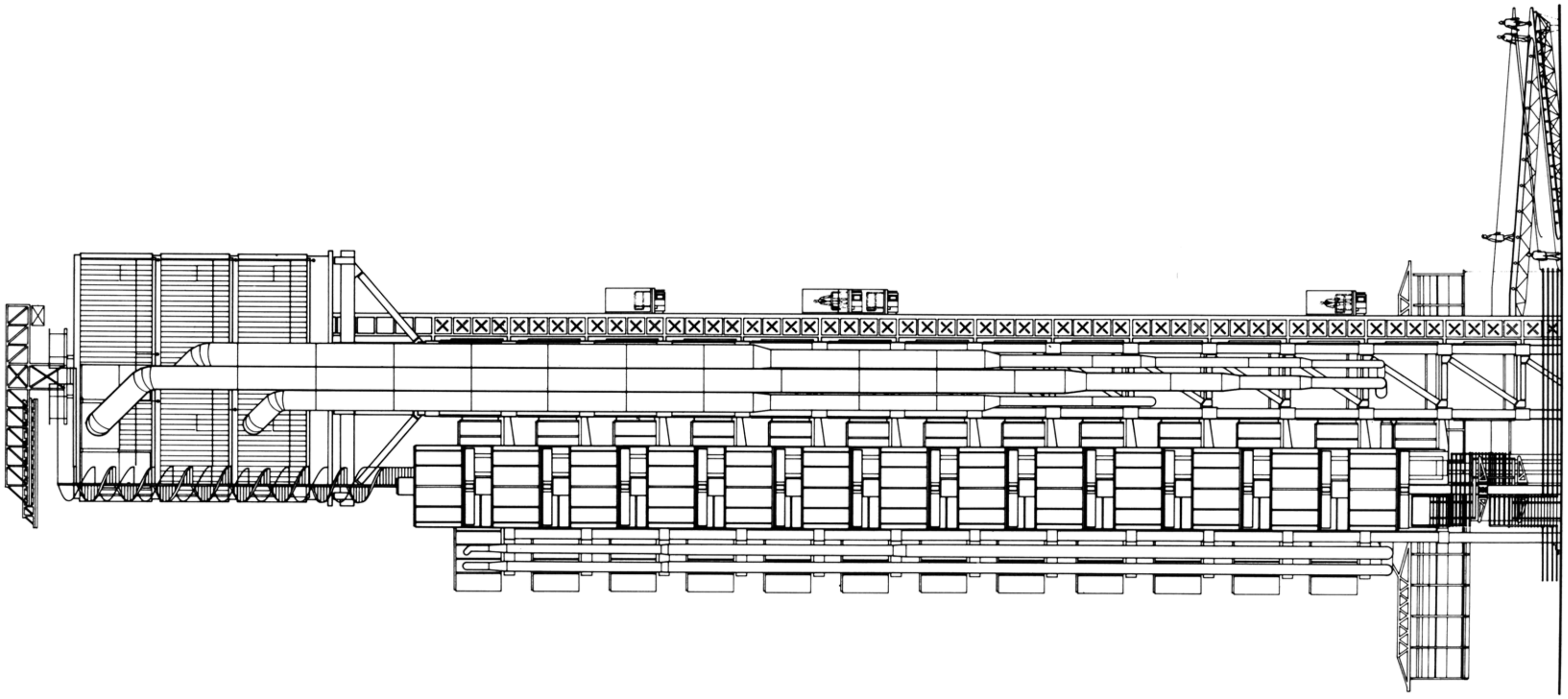
John Young *The Richard Rogers Partnership*





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John Young *The Richard Rogers Partnership*

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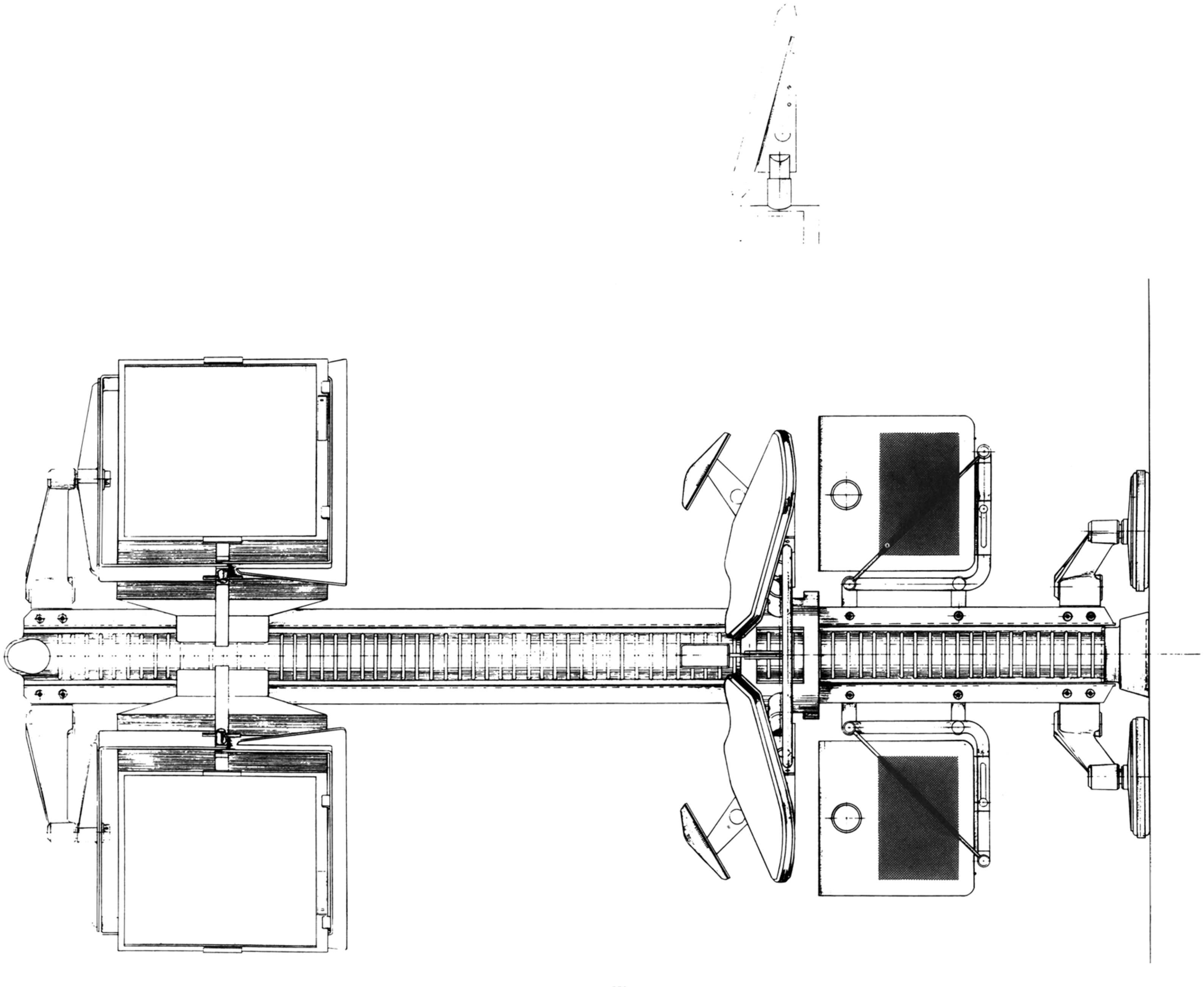
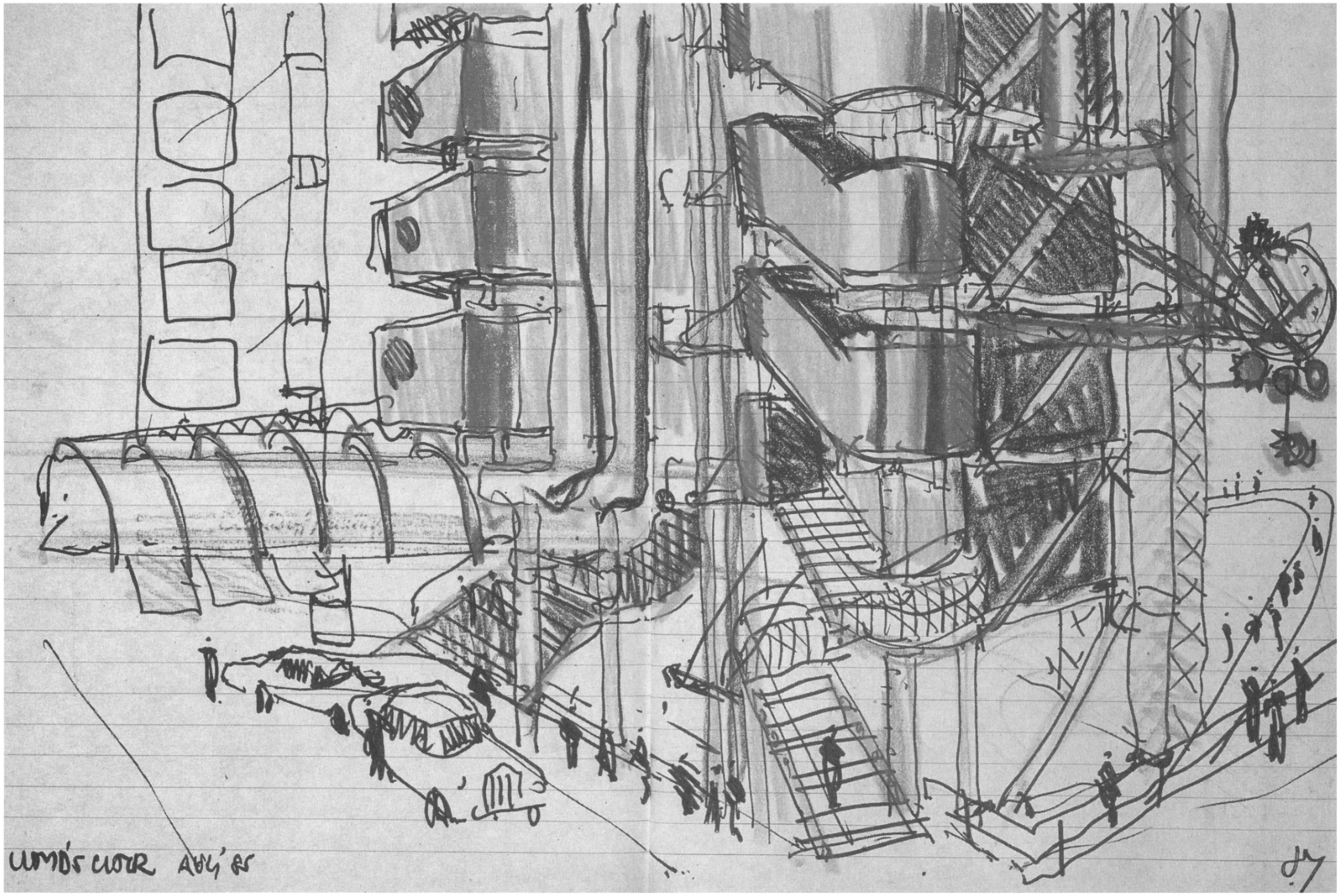
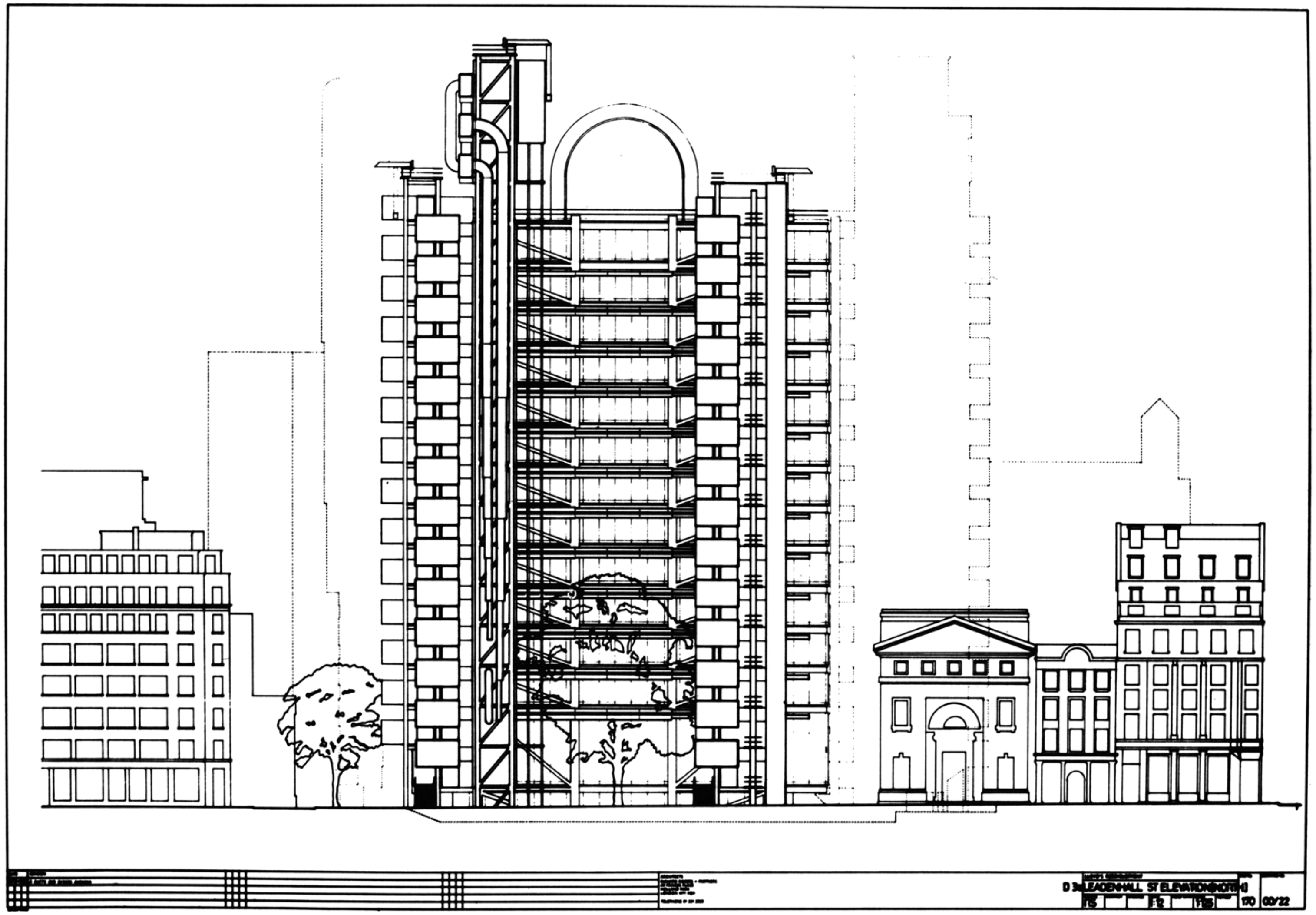




John Young *The Richard Rogers Partnership*



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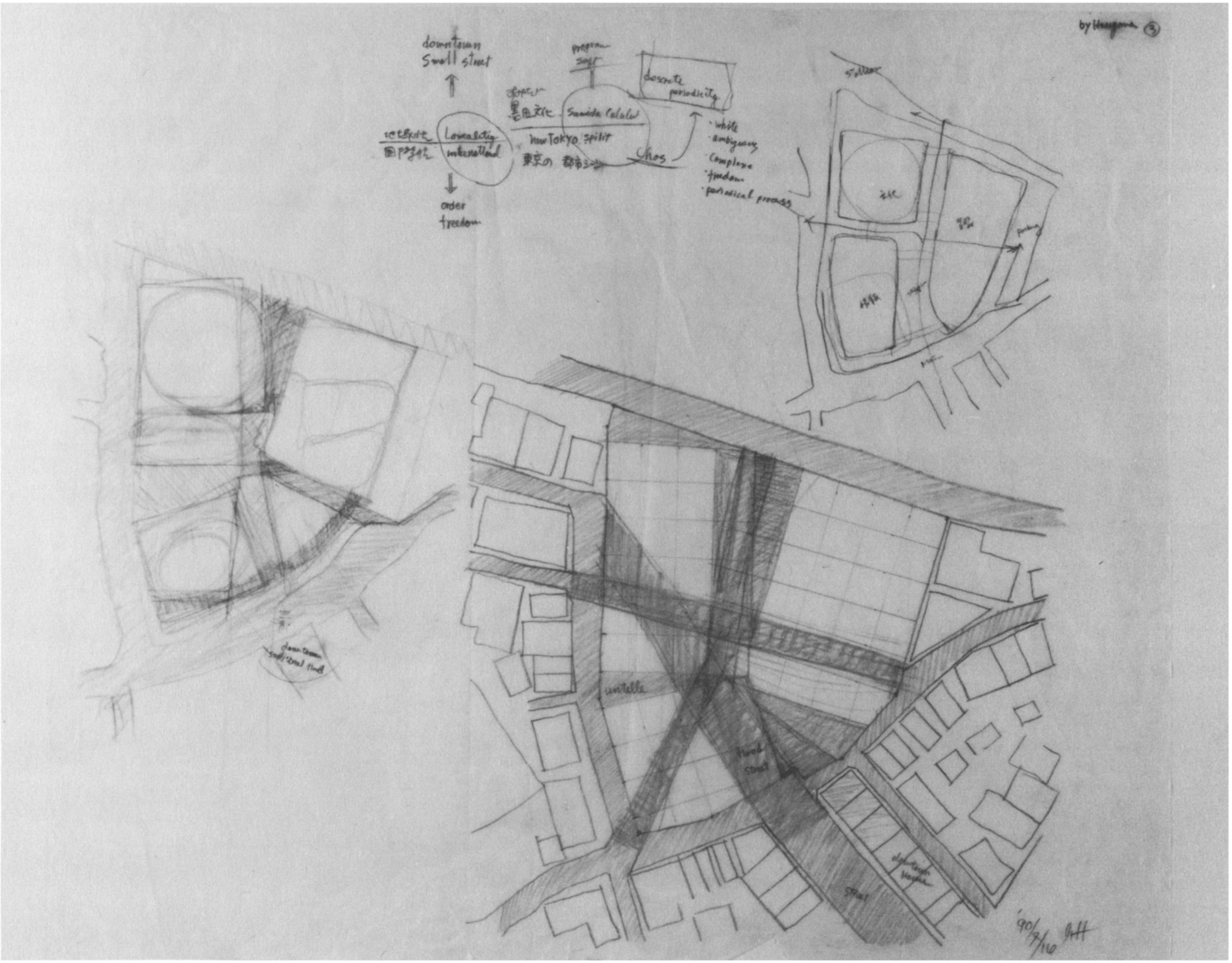by Hasegawa ③
downtown
Small street
Locality
international
order
freedom
墨田文化
Sumida Culture
new TOKYO spirit
東京の
Chaos
program
discrete
periodicity
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· freedom
· periodical process
parking
downtown
small street
Flood
Street
street
'90/9/16

Itsuko Hasegawa *Itsuko Hasegawa Atelier*

Itsuko Hasegawa is a fast-rising star of Japanese architecture. Her office of 25 persons, Itsuko Hasegawa Atelier in Tokyo, has been responsible for a number of important projects in Japan.[4]

For Hasegawa, architectural conceptualization involves the reconstruction of her ideas into a form that meets specific architectural conditions. **It is not my way to press my personal ideas into a design. Rather, I always try to express the actual conditions which underlie the design in the construction of my conceptual ideas.** The drawings she produces when first conceptualizing a design are developed in response to what she sees as the local conditions that define the specific project. That is why she feels that **my projects have a great deal of variation in expression and appearance.** In the first stage of design, Hasegawa prefers to work with images and words. These words, either as short sentences or as key words, derive from her drawings and at times appear on her sketches as well. **At the first stage of my work, I usually create words as well as sketches. Both come from the conceptual image I have in my mind. These I transmit to my staff.** After she obtains the client's consent for the basic design, Hasegawa develops a book of words and drawings for the program, which will guide the planning and design of the project. This, along with the working drawings, she uses as part of her final presentation to the client.

The basic conceptual sketches are used by the staff for further investigations. These in turn are used by Hasegawa and the staff as the basis for discussions between them. These discussions and the drawings that are produced as a result become both a drawn and a written record of the investigations that make up the development of the design.

From these discussions and sketches, the staff proceeds to develop the design through the use of computer graphics. Recently, the office has begun to use computer graphics for the basic drawings of a design as well as for development drawings.

All the drawing notwithstanding, Hasegawa believes that the model is the best medium with which to guide the client through the design's development. **The model provides the most realistic image to the client and provides them an easy way to understand the design.** While models are used mostly for client presentations, Hasegawa and the staff sometimes use models for themselves as well, to record and evaluate changes in a design. The models are made in the office during the design development phase and at the same time that the working drawings are being produced.

Drawing, though, remains most important, and the most critical drawings are the plans. For Hasegawa, **they show the real lifestyle or functional aspects that will be found within a project.** Secondary to plans, sections are needed to illustrate the volume of the spaces, and elevations are used to describe the nature of the face of the building.

Unlike other architects, who often see the elevation as the most important and useful drawing to use when dealing with the client, Hasegawa feels that, except for a few knowledgeable clients who are able to read architectural drawings, the elevations as well as the other drawings she and the staff do would mostly mislead. As a result, drawings are used, most of the time, solely within the office.

The one critical exception to the internal use of drawings for Hasegawa is the use they are put to when communicating with the engineers who work on her projects. With them, she says, **I use the basic drawings in order to explain to the engineers what our ideas are about the fundamental structural and mechanical systems. This is because, in my architectural way of thinking, the structural system for the building is very important. So we need to communicate and share the fundamental design concept for the project with the engineer in the clearest and most complete way possible.** Hasegawa begins her discussion with the engineers at the earliest stages of design.

While Hasegawa uses plans, sections, and elevations in her work, she usually does not use perspectives or axonometrics during the design process, because **they give us images that are too different from the real and are not really valuable in realizing the project. I don't trust their images.** If Hasegawa does not find perspectives and axonometrics useful during the design process, she does find the use of computer graphics very exciting. Computer graphics, she believes, push us away from ourselves. **They are an exciting way to stimulate and accelerate the development of a design. By translating all the information of the design into a digital form, we can share this information on computer screens in real time and thus we are better able to discuss the problem of the design process.** As a result, the office works better as a group.

When Hasegawa designs a large public building that requires the involvement of a large group, she uses words as well as drawings to communicate her ideas. In such projects, there are a great number of individuals involved with the project who are not architects, and it is therefore important to transmit one's ideas through words so that people will understand what the architect is doing. In a way, Hasegawa feels that she must be able to construct, in these instances, an architectural work through words.

After finishing a design, Hasegawa uses everything from plans to details when publishing it in architectural journals and books. **[Because] I positively adopt new and advanced products as building materials, I feel it requires that I make information about these products widely available. I think it is valuable to announce them and do this through publication.** Sharing information is generally important to Hasegawa. In many cases, even with clients, she will provide plans of the project and give them as much information as possible in drawings, models, and words. Sometimes she will sketch while talking with the client.

She feels this is particularly important in Japan where, unlike the United States, there are few fixed plans for houses and each client wants a house that is specifically his or her own. Because designing a house is about designing the lifestyle of the client, Hasegawa feels that plans are of critical importance in the process of design and communication.

With her staff, she likes to communicate through all sorts of drawings. When she first started working, she could do much of the work herself. Now, the design is fixed through meetings and discussions with the staff. At these meetings, she is receptive to the suggestions or ideas of her staff.

With consultants like engineers, she usually presents the basic drawings like plans, sections, elevations, and even sketches from the advanced stage of conception just after she finishes the fundamental design concept. Then she explains her ideas in the drawings to them and discusses their contributions to the project.

Early on in her career, she used to discuss her work and the work of others by discussing their and her drawings. Today she is too busy to undertake these critical discussions. When foreigners visit, though, Hasegawa is more than willing to show them her new projects and share with them whatever they want to see of her drawings.

Overall, for Hasegawa, the drawing, properly used, is one tool (along with words and models) that is critical to her design, and to the way she feels it is necessary both to understand a design and to communicate it to others.

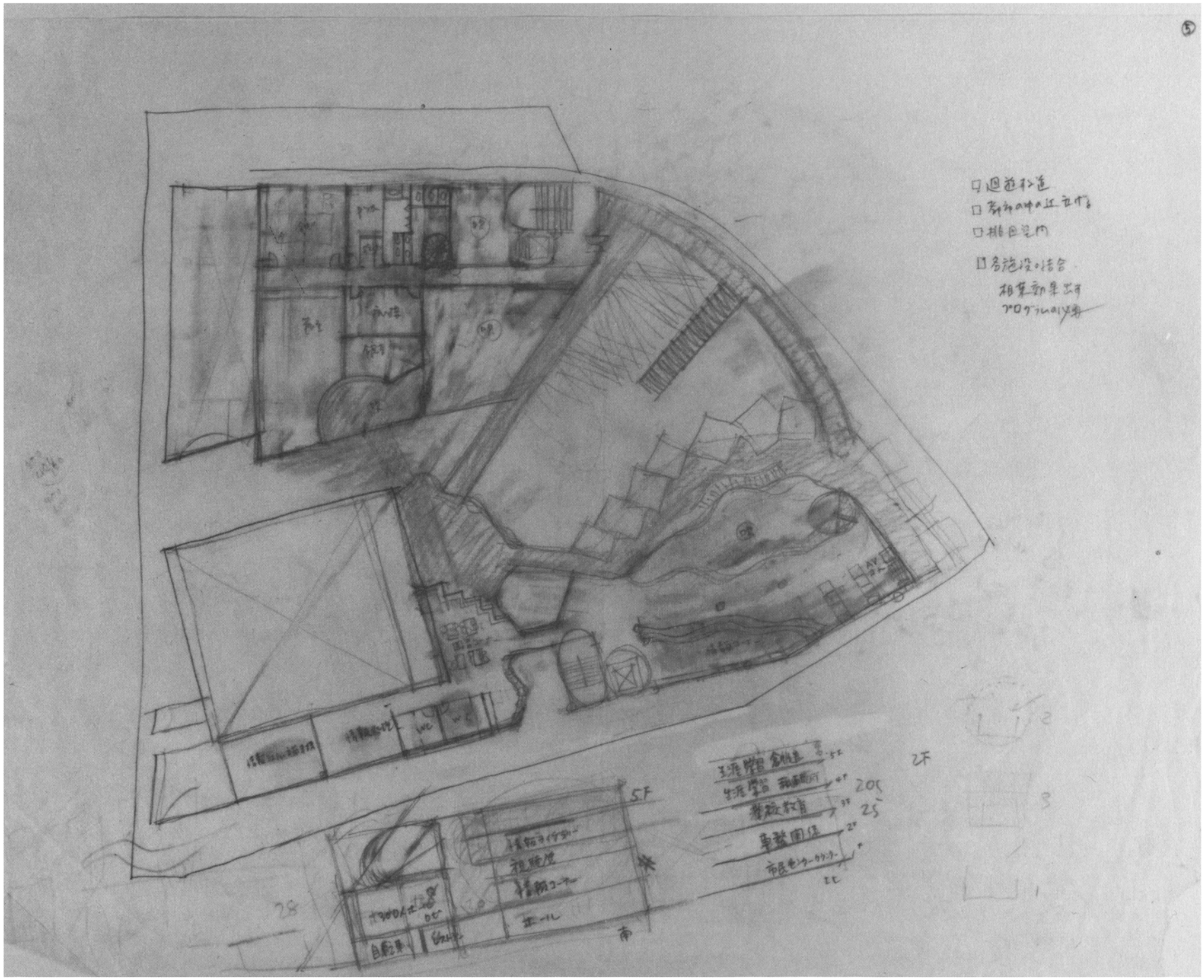
The use to which Hasegawa puts drawing and the types of drawing that she uses become clear when looking at the design for the Sumida Culture Center. What one notices is that the drawings are essentially of two types: (1) what we might call the "fundamental" or conceptual drawings, which are sketchlike and relatively abstract, and (2) the working drawing, which serves as the basis for both design development and realization.

The design for the Sumida Cultural Center, located in Tokyo, was awarded to Hasegawa in a competition she won in October 1990. The building is designed to house community-based cultural events; construction was to begin in 1993.

The first or "fundamental" sketches (figures 89–92) for what would eventually become the final competition drawing and model (figures 93 and 94) are typical of Hasegawa's approach to design conception. Done both in color and black and white, they are also filled with words. Images and words are used both as a mnemonic for herself and as the basis for design development by Hasegawa as well as her collaborators in the office (figure 95).

Although she does draw a lot, she also uses various kinds of models for both presentation and design analysis. Some are actual three-dimensional models (figure 96), while some are models produced on computers (figure 97). The first model illustrated here was done in order to get permission to change the design of the roof, permission which was refused; the second was produced for the final review of the design by the office and the client.

As the design moves from conception to develop-


⑤
□回遊する道
□都市の中の丘 立ける
□相互案内
□各施設の結合
相乗効果出す
プログラムの必要
WC
WC
情報ライブラリー
視聴覚
情報コーナー
ホール
5F
南
自転車
生涯学習 会議室 5F
生涯学習 研修室 4F
学校教育 3F
事業団体 2F
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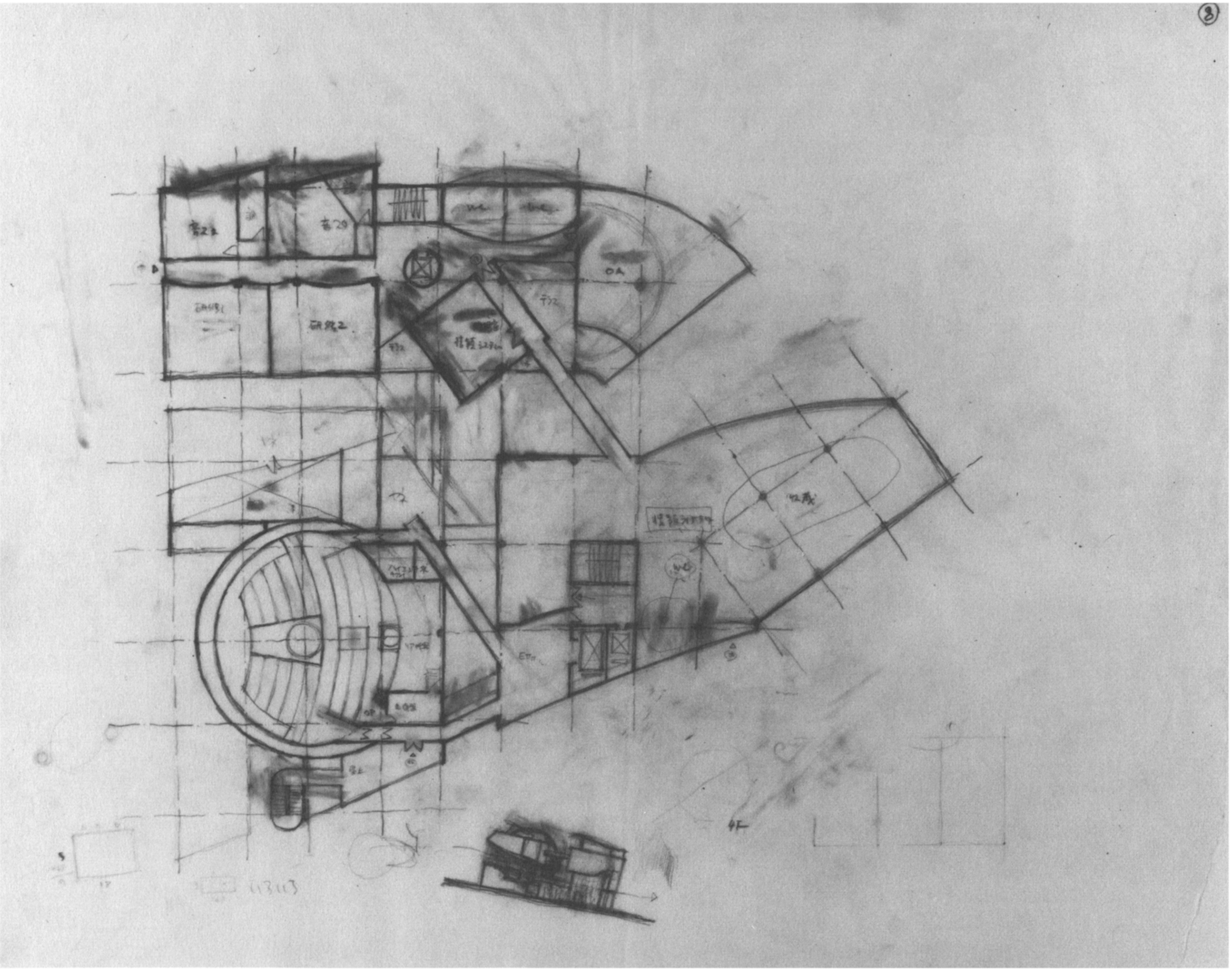

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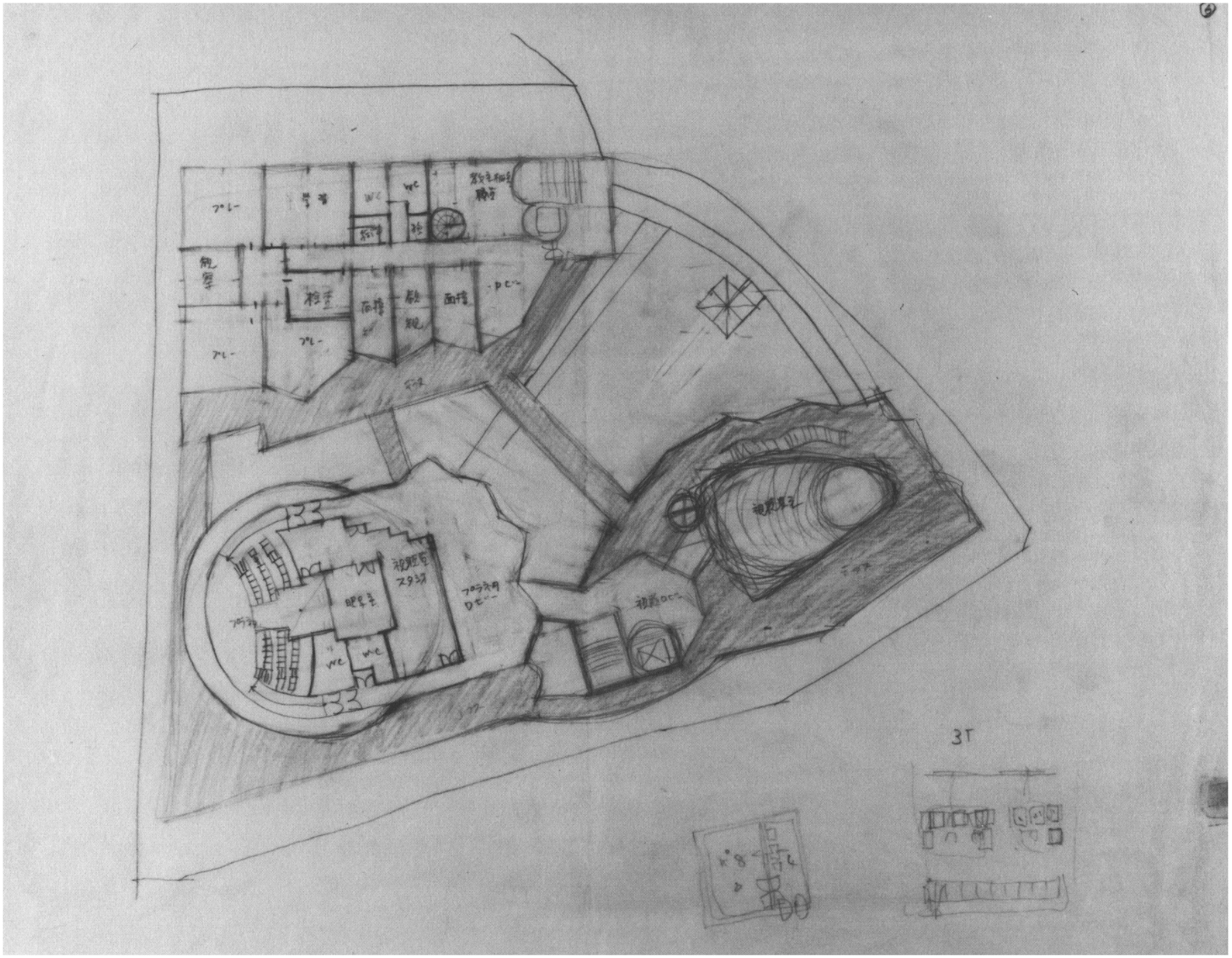
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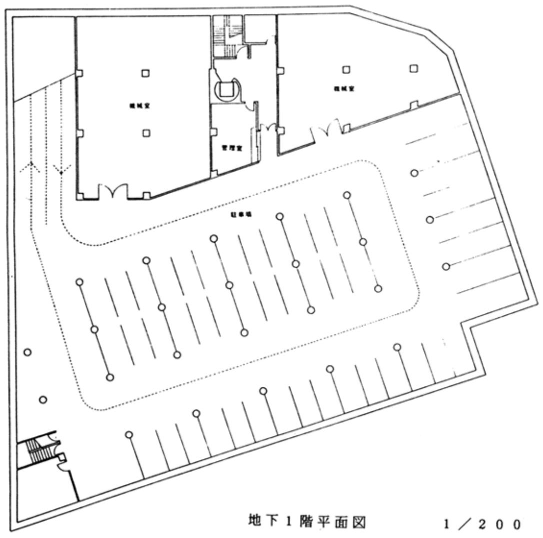
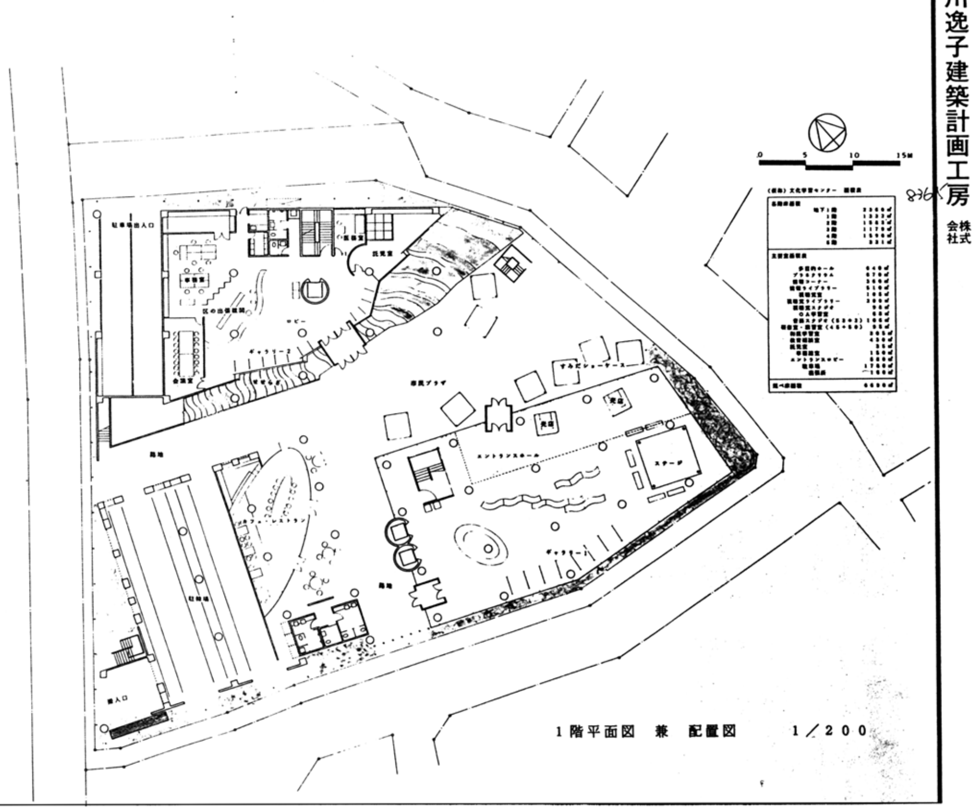


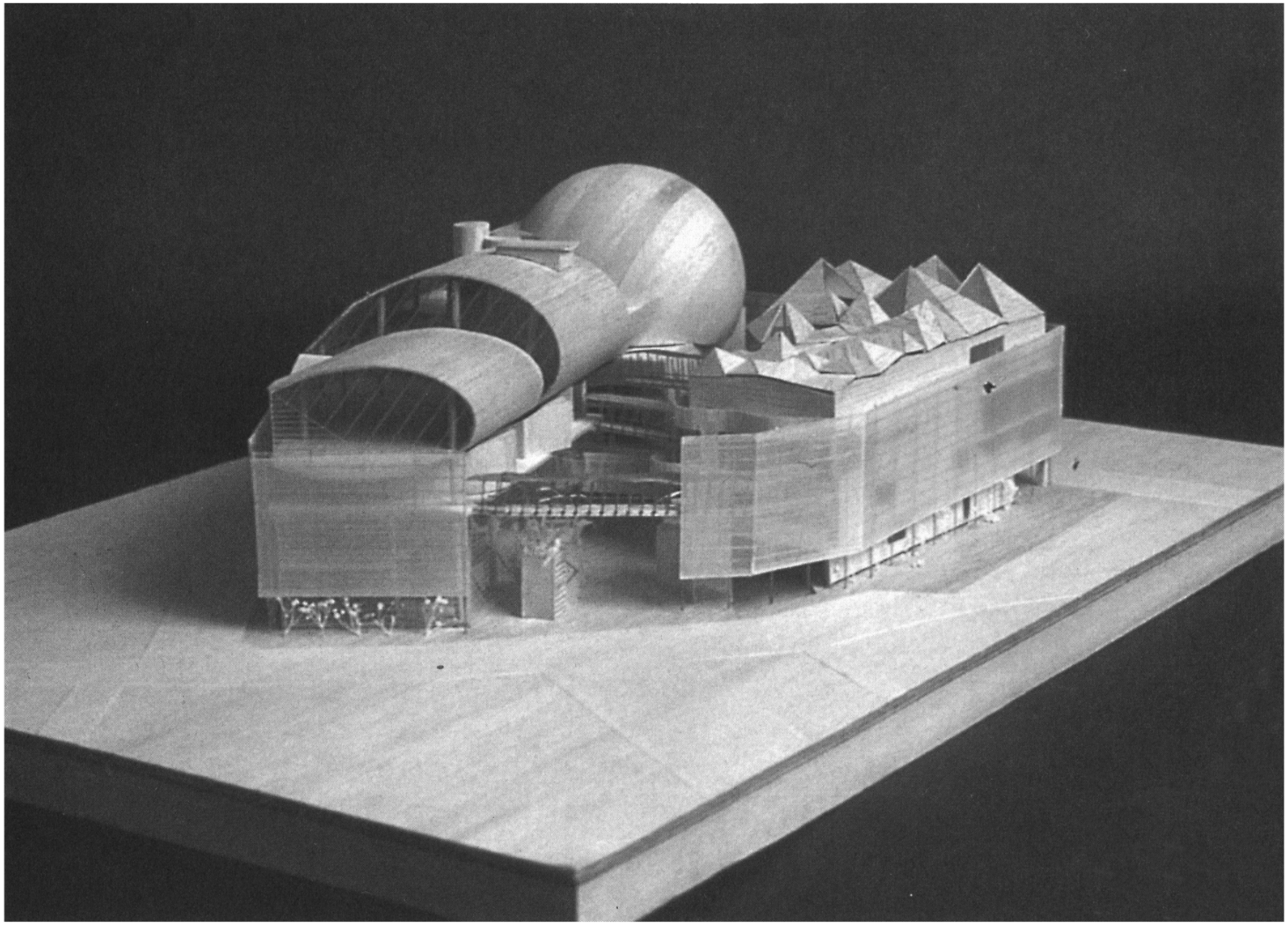
地下１階平面図　１／２００



１階平面図　兼　配置図　１／２００

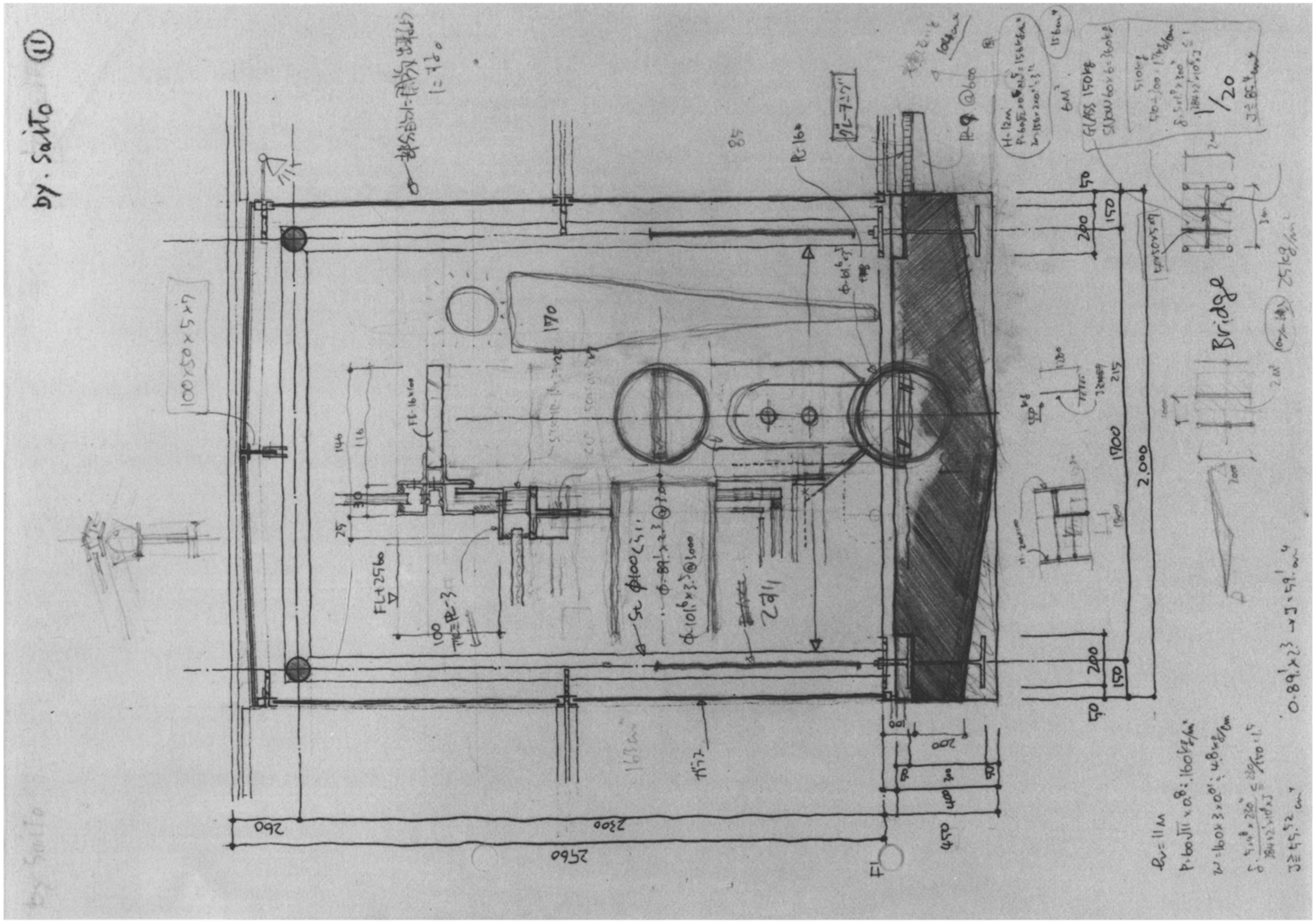
長谷川逸子建築計画工房

株式会社



Itsuko Hasegawa *Itsuko Hasegawa Atelier*

208


by. Saito
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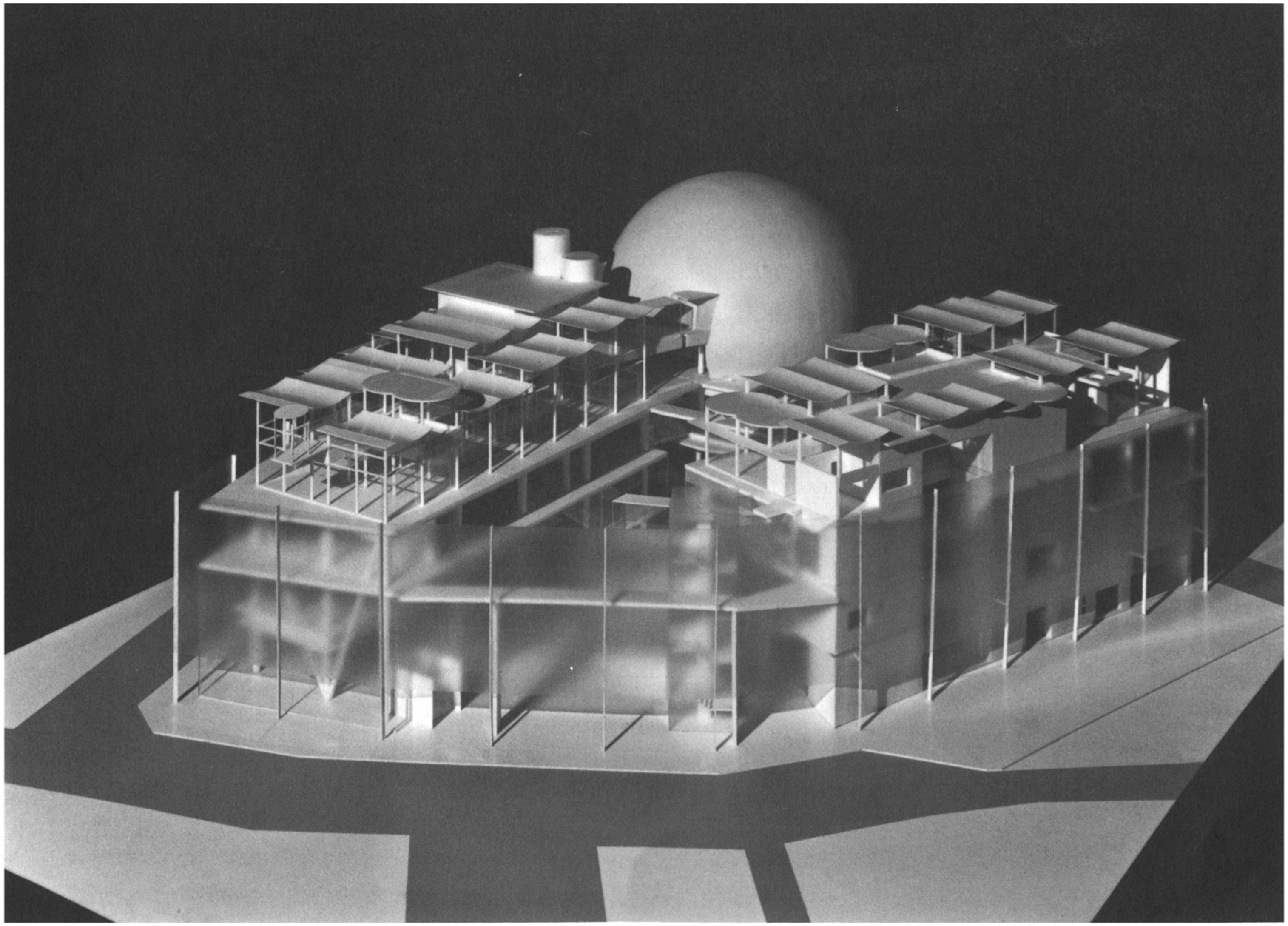


96

Itsuko Hasegawa *Itsuko Hasegawa Atelier*

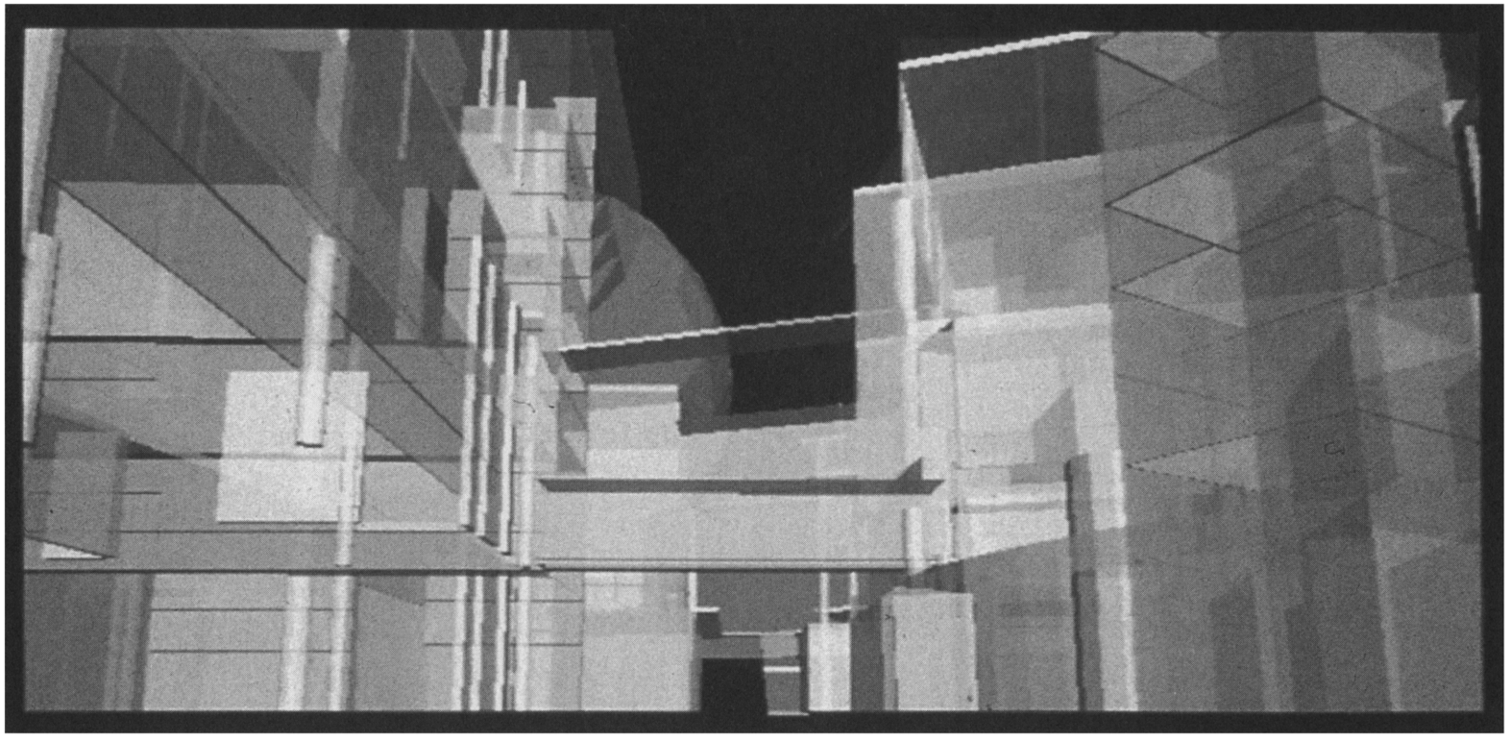
ment, both hand-drawn and CAD drawings are used. Figure 98 is a detail done by hand by Hiroshi Nishimura during design development and looks at details of the roof design. A drawing produced to analyze the connections between the various buildings (figure 99) during the last phases of design development was also done by hand.

However, development drawings to look at and analyze the floor plans, in this case plans for the ground floor (figure 100), the fourth floor (figure 101), and the fifth floor (figure 102), were produced through the use of CAD. So, too, the drawing for a study of the final elevation of the five-story building (figure 103).

While Hasegawa does most of the drawing in her office, at times she does use the work of others like engineers for specific studies and analyses of particular details. An example is the study of the structural members of the roof done during design development (figure 104).

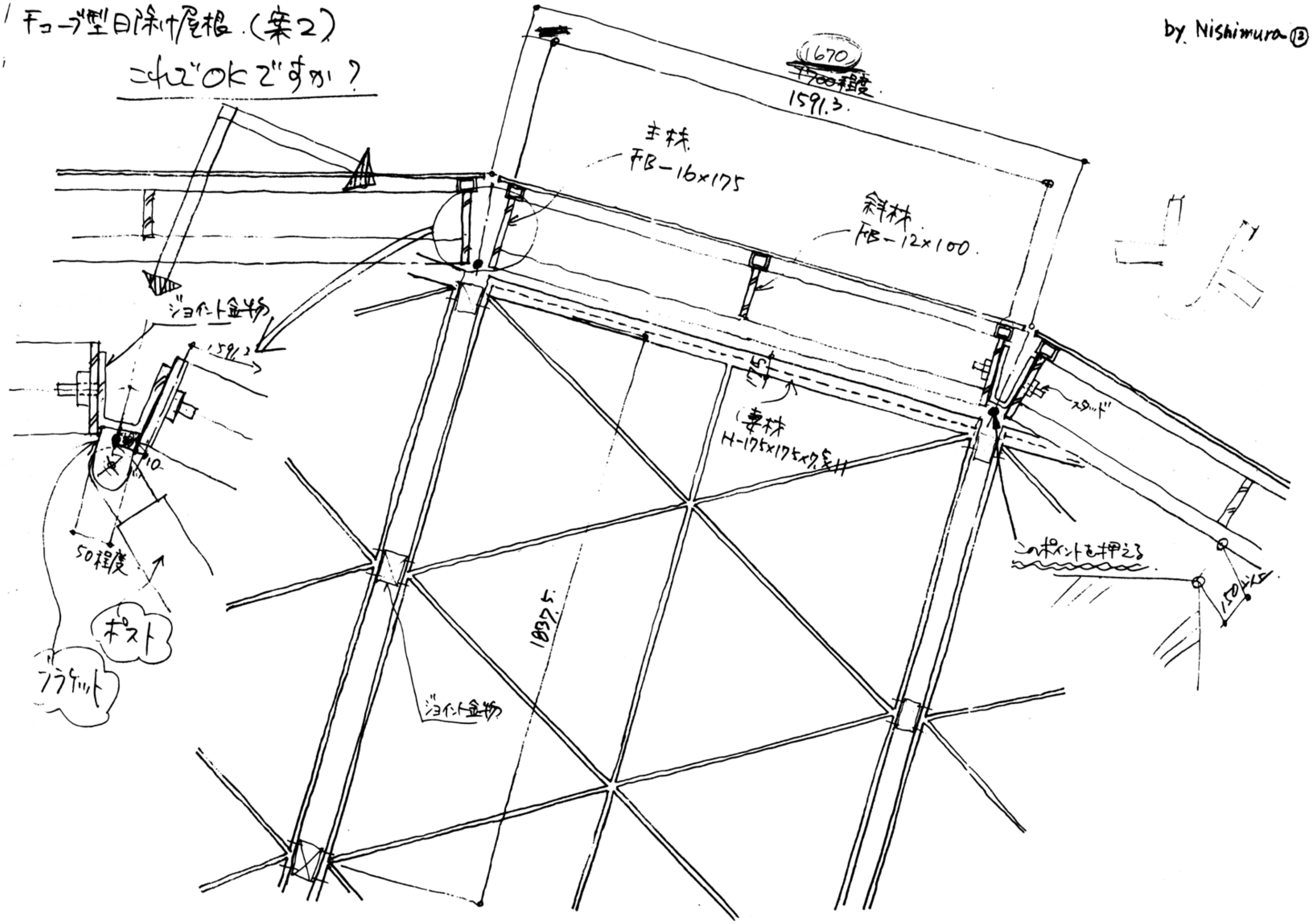
When the design is developed, the office does its own working drawings by hand (figure 105) rather than computer.

Using hand-drawn images, computer-drawn images, three-dimensional models, computer-generated models, and words, Hasegawa produces some of the most exciting new architecture in Japan today. At base, though, drawing is still her primary instrument both to conceptualize and to communicate her initial design ideas. Drawing is a crucial, even central act for Hasegawa, helping to define her practice and her architecture.



97

Itsuko Hasegawa *Itsuko Hasegawa Atelier*


チューブ型日除け屋根（案2）
これでOKですか？
by Nishimura ⑬
1670
~~1700程度~~
1591.3
主材
FB-16×175
斜材
FB-12×100
ジョイント金物
1591.3
175
妻材
H-175×175×7.5×11
スタッド
このポイントを押さえる
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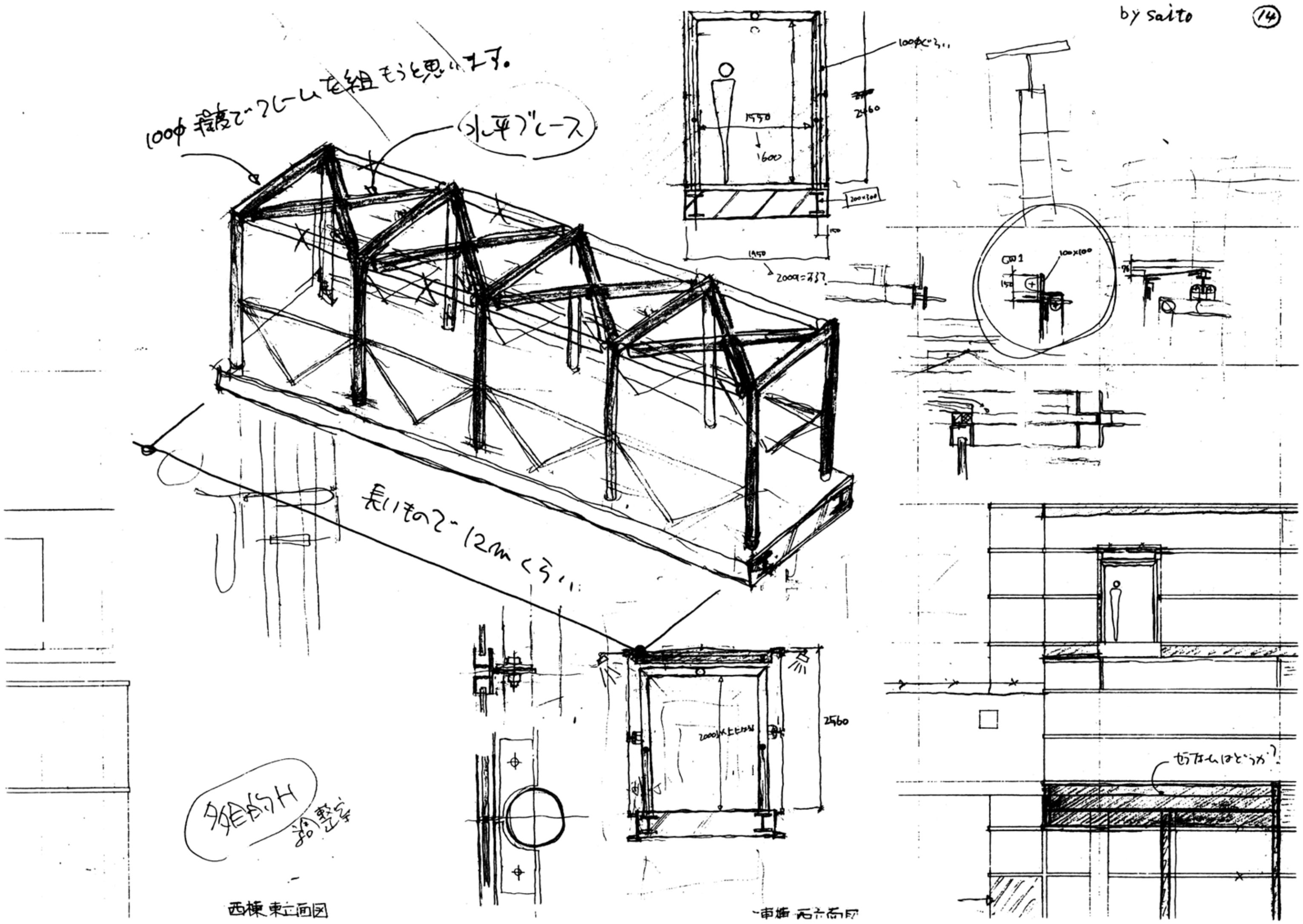
ブラケット
1897.5
ジョイント金物


by saito
⑭
100φ 程度でフレームを組もうと思います。
水平ブレース
長いもので12mくらい
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1600
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2009=ある?
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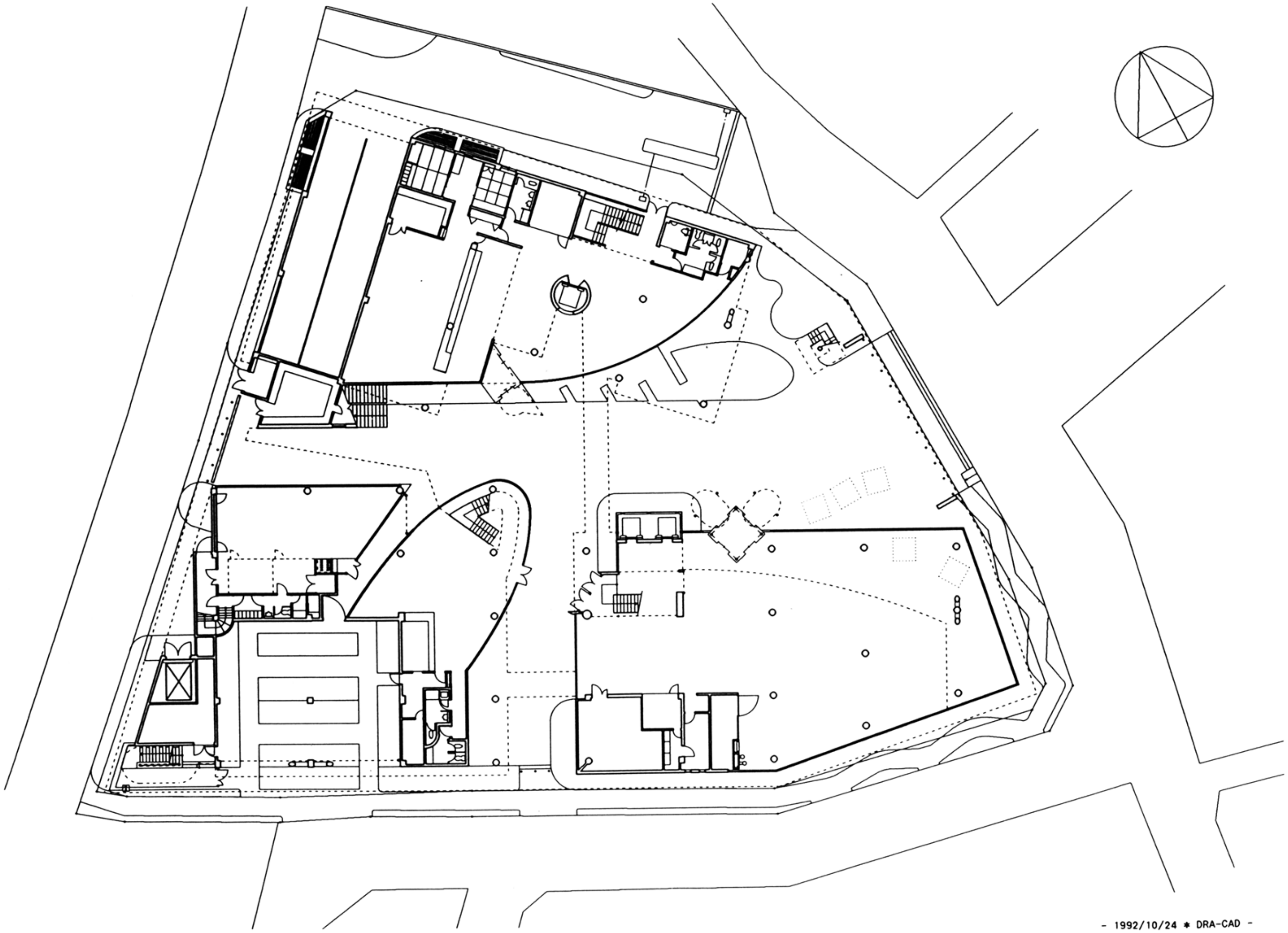
東棟 西立面図



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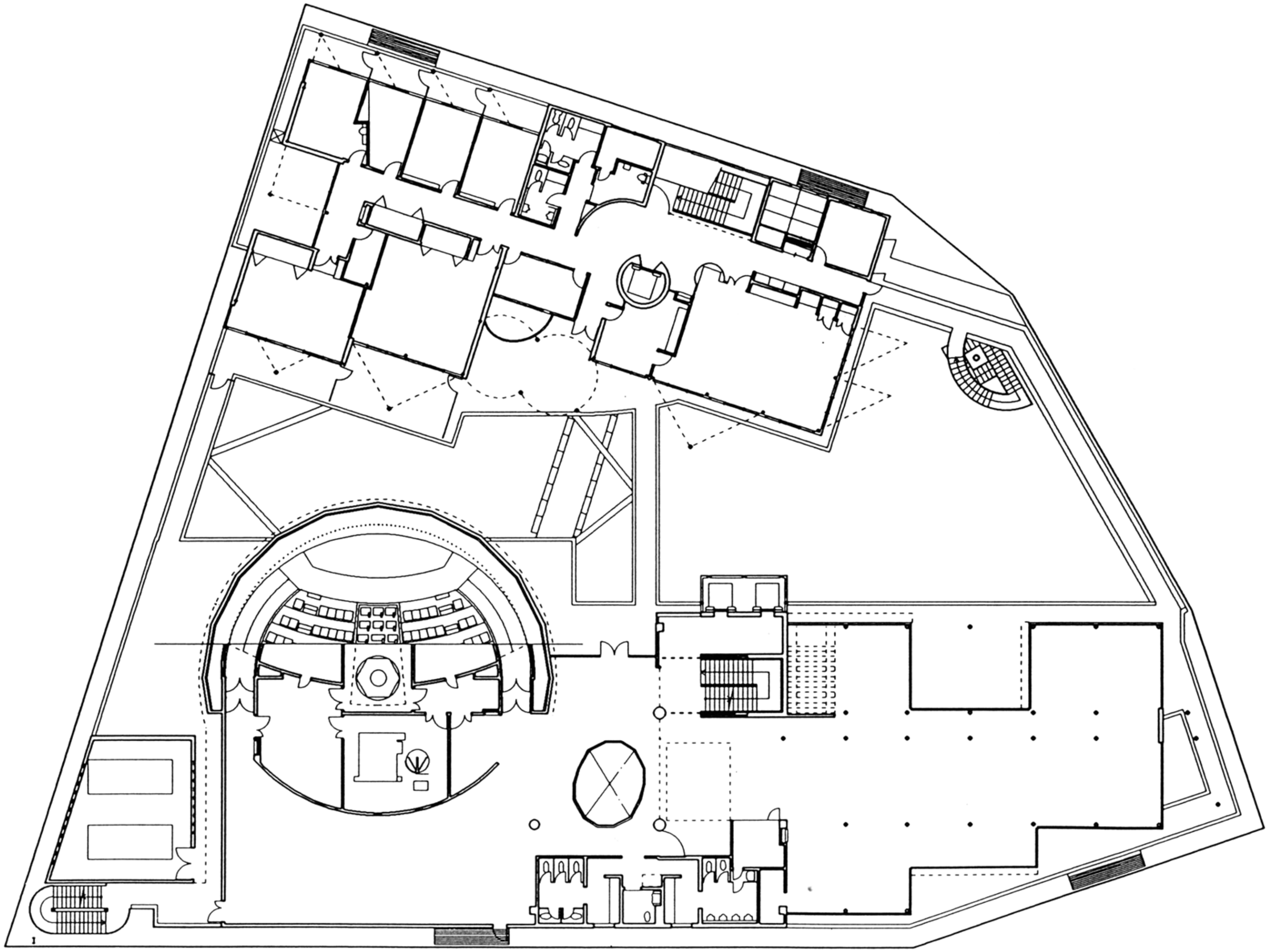

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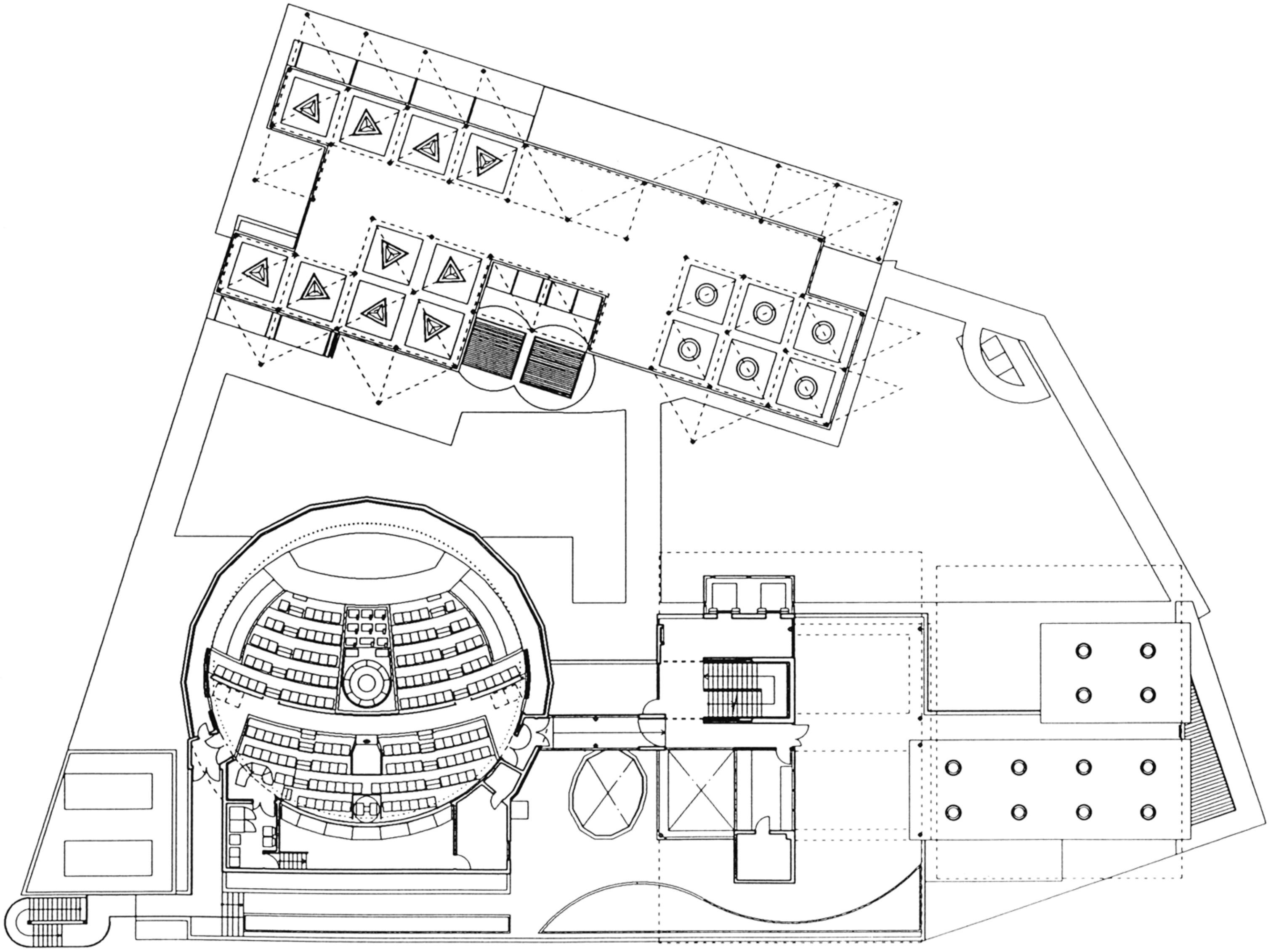
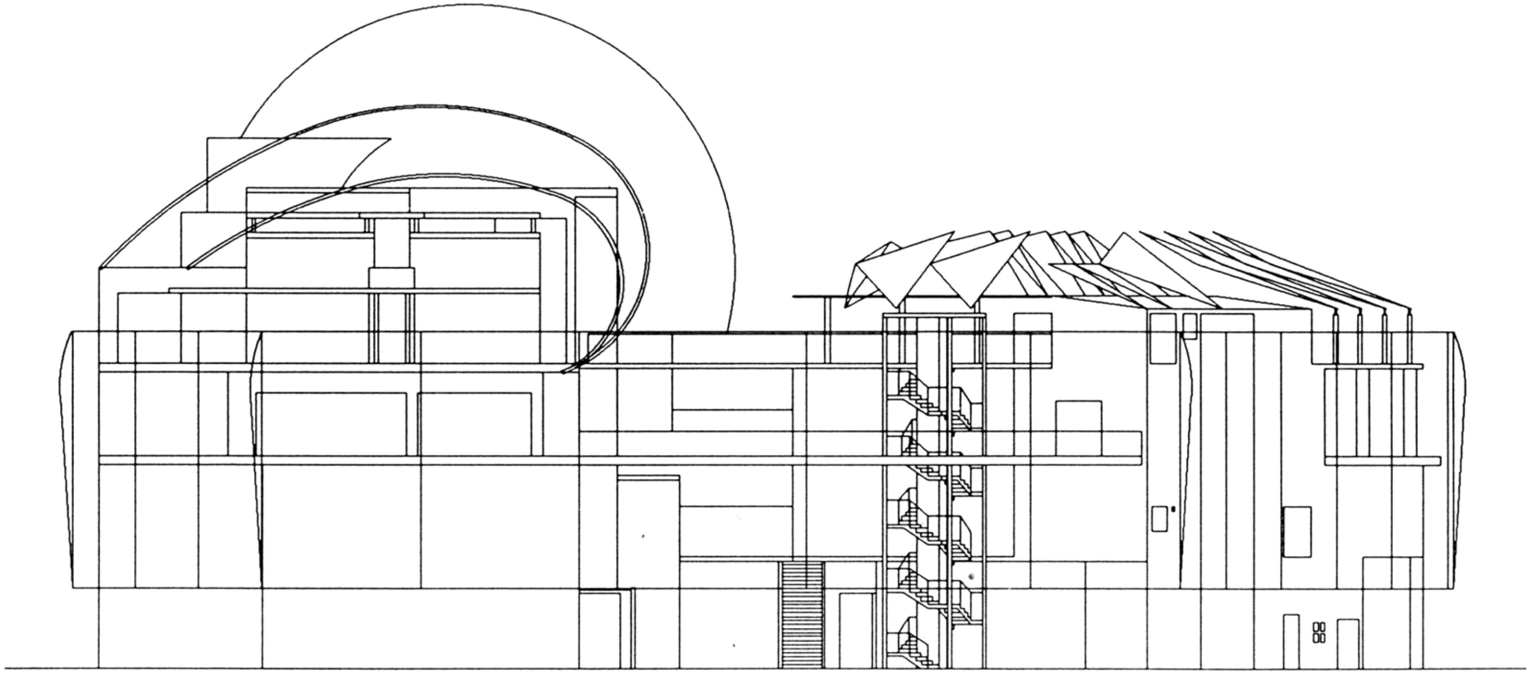
Itsuko Hasegawa *Itsuko Hasegawa Atelier*

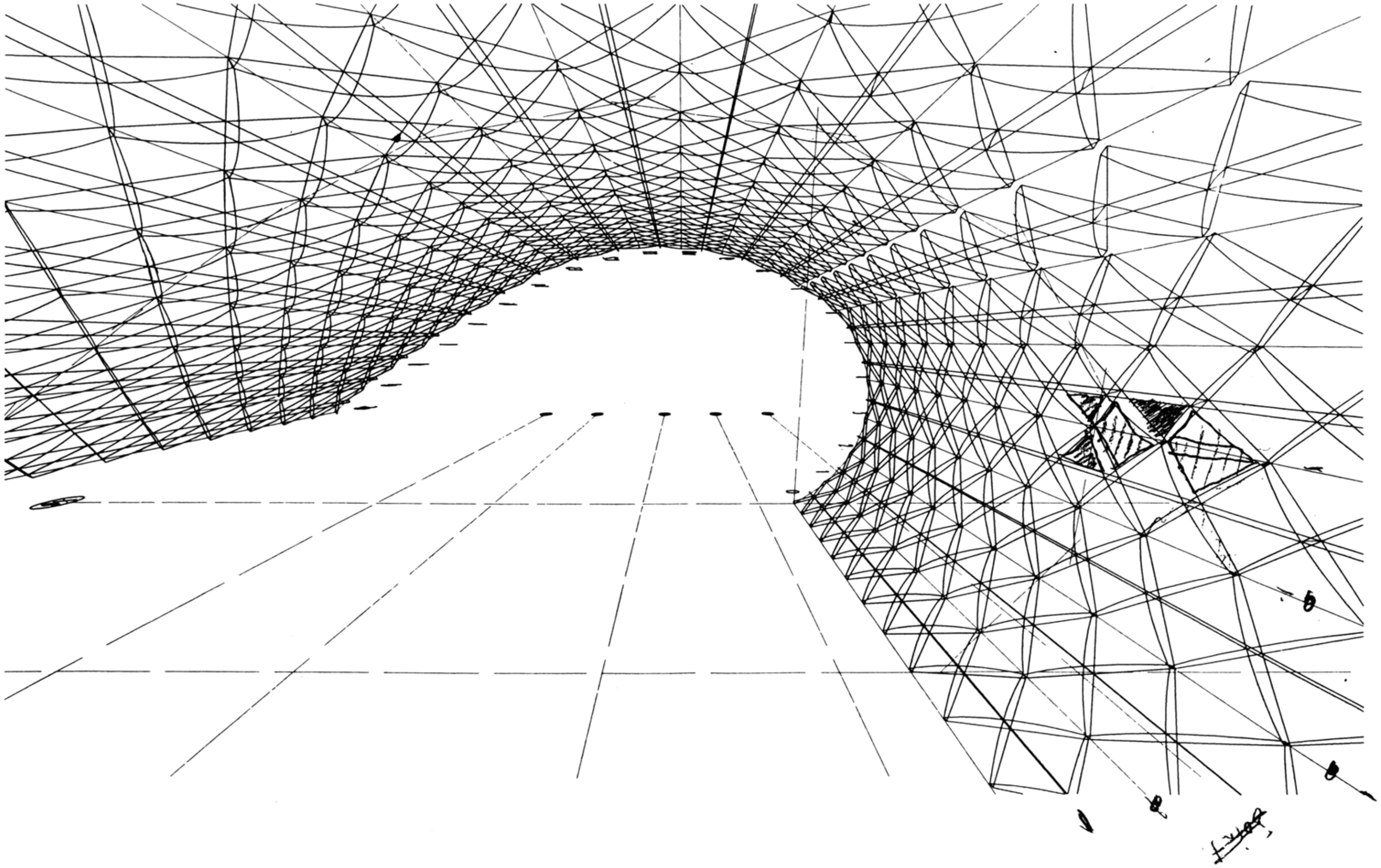


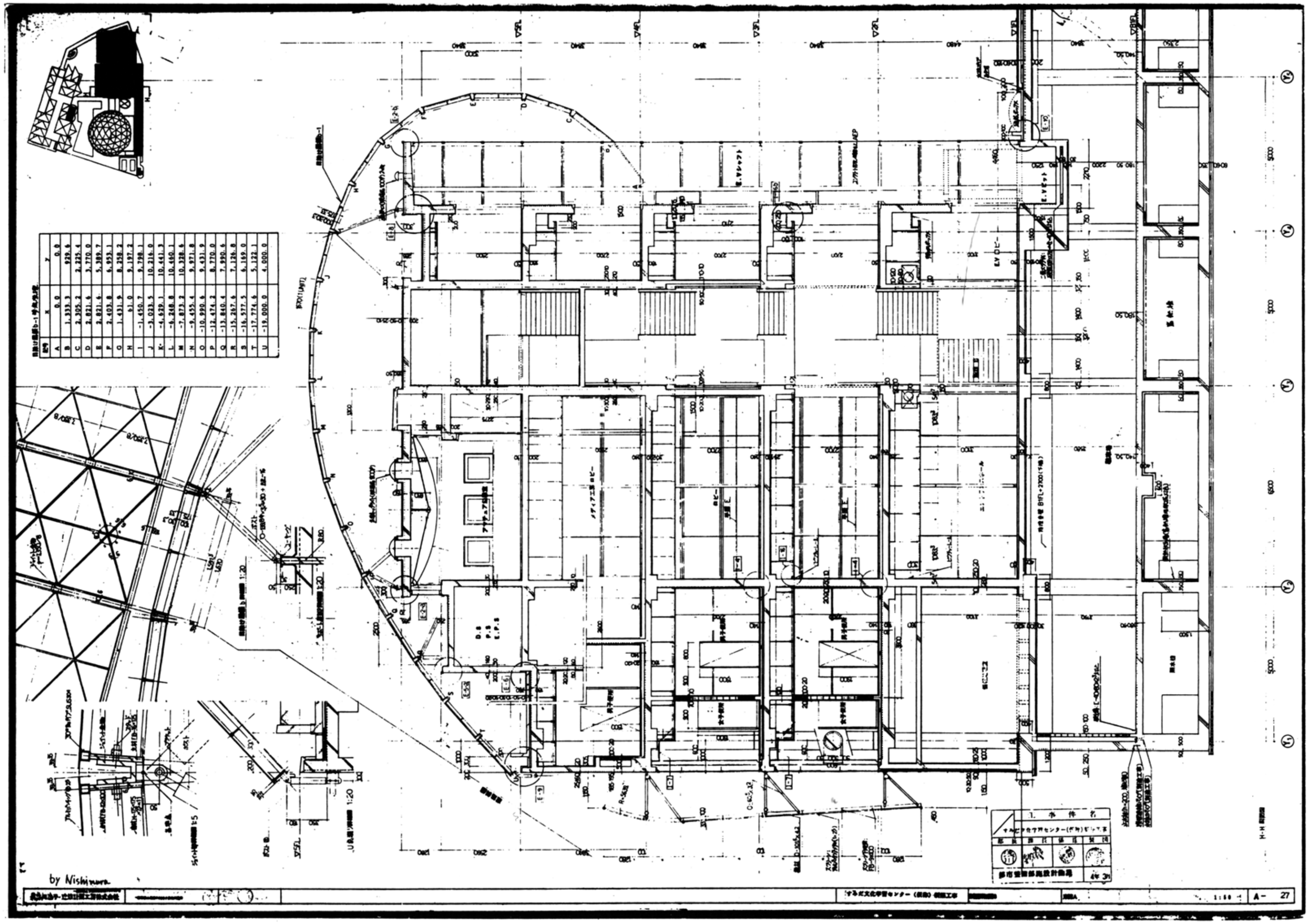
102



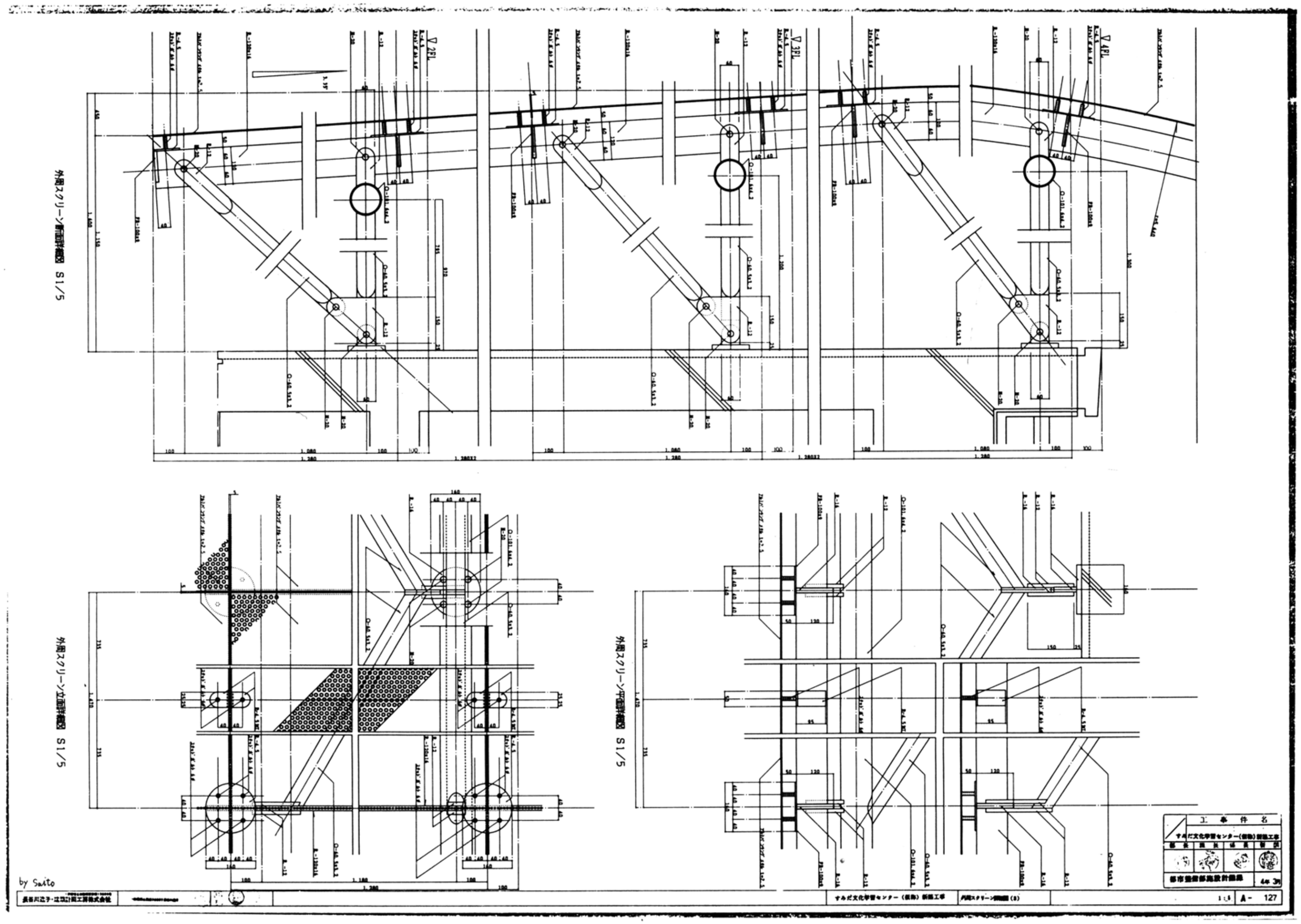
103

Itsuko Hasegawa *Itsuko Hasegawa Atelier*

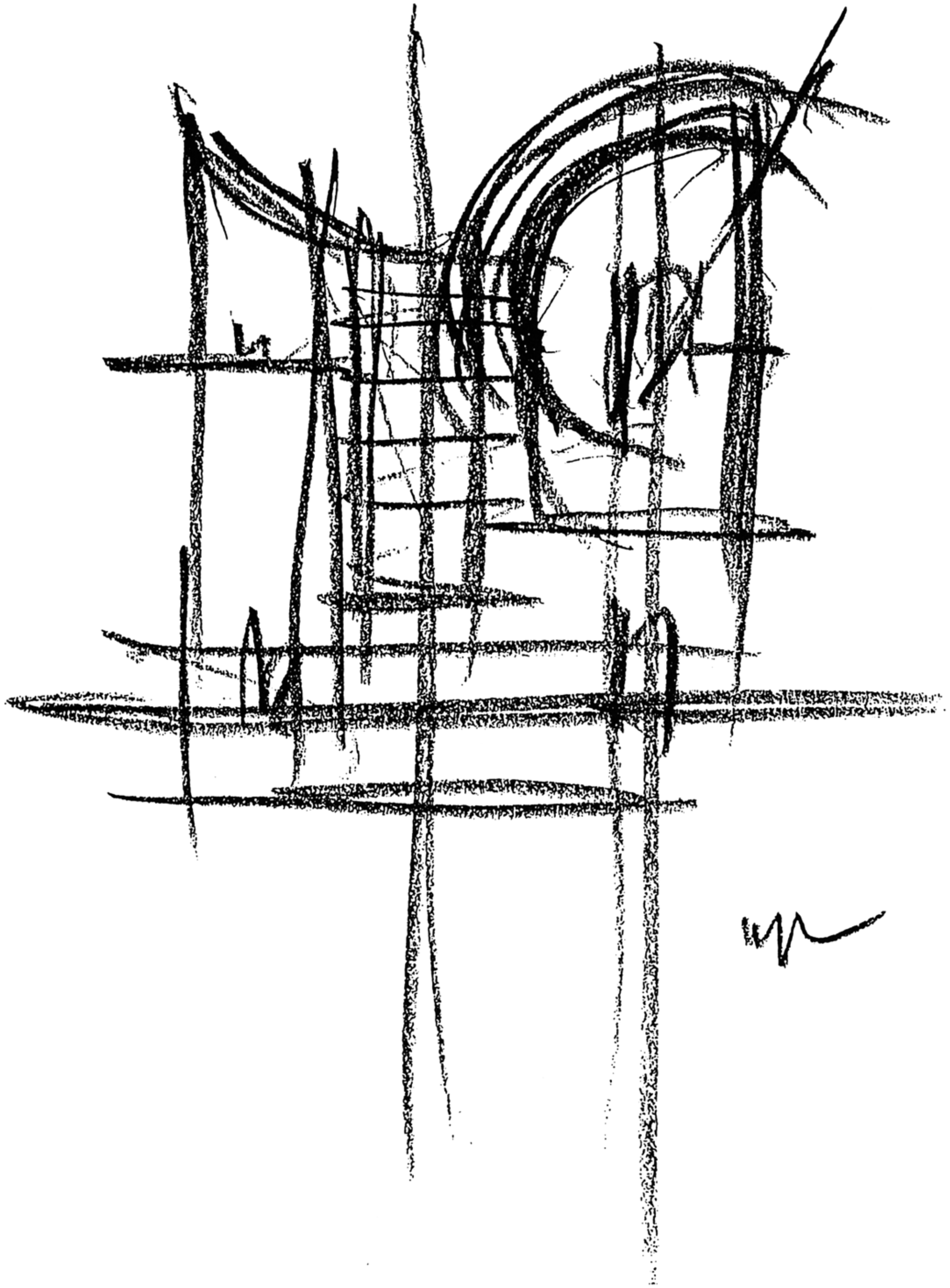




105a


外周スクリーン断面詳細図 S1/5
外周スクリーン立面詳細図 S1/5
外周スクリーン平面詳細図 S1/5
▽2FL
▽3FL
▽4FL
工事件名
A- 127
by Saito

105b



William Pedersen *Kohn Pedersen Fox*

William Pedersen of Kohn Pedersen Fox, a firm of 150 architects and about 50 support staff, is responsible for some of the most important skyscrapers and corporate buildings designed in the last 20 years. From 333 Wacker Drive in Chicago through the Procter and Gamble Building in Cincinnati to the only addition to Rockefeller Center in New York, Pedersen has had a major influence on our urban landscape.

Although he draws constantly, the size of his firm and the large number of projects that it undertakes mean that the role of drawing in the process of design varies considerably, as does his own personal involvement in any given project: **In our practice I use drawing in different ways. On some projects my drawing is limited to conceptual sketches and subsequent "critique" sketches as the design progresses. On others, my drawing is more extensive during the detailed phases. This happens on all the smaller projects and, of course, the furniture I design. I would love to make more drawings on all the projects, but the scope of our practice is large and this is not possible. It is my ideal to be able to do more rather than less of the drawing in the future.** A small house designed for a friend provided that ideal process. In this case, drawings were used by Pedersen to generate his ideas: **For the house the drawing process is fairly well documented, from the beginning of my original thoughts to the end of what I call the conceptual realization of the direction. The full evolution of the process was documented over a series of 30 to 40 pages. All the sketches were just purely thoughts that were introduced without any regard to their graphic consequences. In other words, this was not something to be seen by the pubic: it was just a pure documentation of a thought process.** However, Pedersen often works under different conditions, particularly when dealing with most skyscrapers. In those situations, drawing is initially less critical to the process of design because the internal programmatic issues are usually well known and the structural forms already defined by the developer. For skyscrapers, it is the external context, their siting in the urban landscape, that becomes the most critical job for the architect. So it is to this that the practice will tend to turn its attention first: **A lot of work that's done for larger office buildings is done in model form, not in drawing form. I use drawing to get some very basic ideas started, but these will immediately be translated into clay models. We usually make a model 1 inch to 100 feet of the entire context.**

So the initial drawings themselves are very embryonic and, because of the fact that this building type doesn't have any real programmatic complexity, the drawings are less developed than for a building which has more programmatic complexity. In the design of a house, because of the range of possibilities and because a house is a fresh problem for him, drawing is necessary to get a conceptual hold on the project: **I generate my conceptual intentions by drawing. And while they may appear completely unformed, there does seem to be a pattern that evolves and takes shape exclusively through the drawing process.** For large buildings that are well defined this is not so necessary. **With office buildings we have evolved a series of compositional strategies over time. So in working out these strategies on office buildings, we begin with more preconceptions because we have done so many. I can work more efficiently than I can with a house, for example, where I have to discover its possibilities step by step.**

In general, drawings have not meant as much to Pedersen as important personal objects that document the architect's creative work: **Our building in Frankfurt is somewhat different. Not only did I do the initial conceptual sketches but I also did drawings for much of the conceptual development before working with a design team. However, I must say that so much of the conceptual drawing I have done over the years I have regarded as expendable and I threw them away when they had served their purpose. Now they seem to have a bit more value, and they have become more important to me. I don't think that I have a drawing of 333 Wacker Drive that I actually did as a conceptual drawing. I did do elaborate finished drawings much later in the design process, however. They have been widely published. It is only lately that I have become a little more self-conscious about my early drawings. It does seem important as a way of establishing a record of the process.**

From the conceptual point of view the drawing is a fundamental tool, along with the clay model. Pedersen rejects drawings that are self-consciously artistic and are drawn to do more than help conceive and communicate architectural ideas in the process of design. The drawing should capture, in the least self-conscious way, one's ideas or emotions at a given time in the process of design: **I was just at a show of New York architecture in Frankfurt and there I saw carefully framed conceptual drawings which one knows have been constructed after the fact, as an effort to somehow convince us that the process [of design] was completely orderly and sequential. I can immediately tell if a drawing was done as part of a design process or has been fabricated later for some sort of intellectual consumption.** Once the process of design has begun, drawing is a critical tool for fleshing out ideas. For the most part, Pedersen uses plan and section during the conceptual period of design: **I find myself, when I think conceptually, sketching only in plan and section. I don't work in perspective. I don't work in isometric. That's a limitation on my own three-dimensional thought process, but nevertheless that is the way I work. Sometimes I work in elevation, but elevation I find is more satisfactorily done in hard-edge as opposed to a freehand.** Because he most often begins with models when dealing with large buildings, the volumetric issues have often been dealt with, at least initially, before drawing begins: **So the basic process, as it works for me, is the initial conceptual sketch, the three-dimensional analysis with models—we make 50 to 100 of the models, you know—and then once they are done we make little sketch elevations.** Once this process is completed, Pedersen begins to look at the surface of the building. At this stage, design for him becomes a kind of layering of aspects and elements of the building through design.

The process of design varies from project to project, though, given the nature of the practice and the number and variety of buildings that the office does. Many times Pedersen's part in the process is quite laborious, while at other times, once the basic direction of the building is set, the drawings are done by members of the design team working through his ideas sketched at the desk of one of his associates. In that case the design process becomes a dialogue between Pedersen and the design team: **Once a project gets under way, then the more developed drawings are dominantly done by the design team. Then it's a process where I am involved in a dialogue as drawings emerge. I think there is a lot to be said for one's personal hand-drawing in every aspect of the development of a design, but I don't know much architecture that is produced by a singular effort. Almost all architecture is produced in collaboration so it becomes a dialogue, more about a process of doing architecture than about personal authorship.** At times the process of design demands that the architect use other means of dealing with people in addition to drawing: **The control of a large number of projects in a large practice is a separate art, and it involves skills in addition to drawing. It requires interpersonal skills by which one can motivate a large number of people to work creatively. How one uses drawing to do this varies from situation to situation.** The process of design in such a situation is less a matter of drawing per se than of the communication between the various actors in the project. Such communication is best seen as a dialogue in which ideas go back and forth. Because architectural design does become a group process, it is important for Pedersen that his initial concept for the building have clarity.

The extent to which Pedersen finds it important to draw, as noted earlier, is related to a large extent to his familiarity with the type of building being designed and the degree of freedom he is given by the client in the design process. It is also strongly a function of the type of building being designed: **This project we are doing in Frankfurt is closer in process to the design of a house because of its complex internal biology and complex parts. There was an opportunity and necessity to struggle more vigorously with just the basic *parti* of the project.**

The number and importance of the conceptual drawings are also a function of the type of building being designed: **Over time, we have developed many conceptual strategies for the design of large office buildings. Sometimes we use similar compositional strategies on a series of buildings. For example, Frankfurt, Rockefeller Center, Montreal, and Bellevue share an approach while St. Paul's and Goldman Sachs share another. Therefore the issue is one of context and sensibility. These inform and deform an underlying strategy which has a more universal applicability. Often my conceptual sketches are a shorthand for ideas I had developed earlier.** For 333 Wacker Drive, after Pedersen visited the site it seemed obvious to him that one gesture, the curving of the building, was inevitable. After that gesture was decided upon, everything else conceptual was done in model form (which is why there are no surviving conceptual drawings from that project, as noted above). Drawing does become more critical after the initial models that set out the siting and massing of a building have been completed, because it is at this stage that the surface treatment of the building is generated: **The development stage begins for me when the surface treatment starts to explain the formal gestures of the building. Because the formal gestures largely concern shape, they are gestures in response to larger contextual conditions. The surface gestures or articulations, though, are responses to the form or shape of the building. The more definitive drawing phase begins at the stage in which the conception of the external surface of the building tries to explain both the form and biology of the building. Once one starts to generate a system for the surface, it becomes a question of developing, at a variety of scales, many possibilities. And that must be done in drawing form because there are too many parts and it is too tectonic a process for models. The more tectonic the process, the more it involves drawing, while the more volumetric the process, the more it involves models.**

For Pedersen, drawing is important at the development stage of design because he believes that the creation of the facade involves more than just placing a skin over a structural body. More than a cosmetic, the facade is a part of the way the whole building as a set of formal characteristics responds to the situation it finds itself in, Pedersen argues. Drawing is critical in the development of the facade because the facade is made up of so many discrete parts that need fitting together: **Wherever the decisions involve complex parts fitting themselves together, one has to do 90 percent of the initial work in drawing form and then use models to actually verify decisions.** Drawing is critical whenever one confronts the way the parts of the building are put together to make a whole. Pedersen has hundreds of drawings made that cover every part of the building where such issues are confronted. Most commonly every part and connection of a building is tested up to twelve or fifteen times with drawings to make sure that they are right.

At the development stage of a large project, there will be about six people on a design team. This grows to about 25 when the construction drawings are to be produced. Sometimes, at a client's request, drawings will be done in concert with a local firm in the city where the design will be built. In such a situation, Pedersen's office will do the schematic and design development drawings while the local firm will do the construction drawings. To assure a sense of quality control, **the design development drawings deal with the profiles of the pieces in such a complete way that they are taken virtually verbatim when translated into construction documents.** However, when dealing with builders and shopwork contractors, Pedersen believes it is often necessary to leave the internal mechanics out of the detailed drawing: **Now so much of the internal workings of details, the guts of the details, involves the specific idiosyncrasies of the various contractors, that largely we don't document them completely. We want to allow for a certain bidding flexibility from one contractor to another. Each of them constructs walls differently, for example. So, what we do offers flexibility. When you detail a system you can do it one way or another. A specific system tends to weigh in favor of one construction method over another, and we try not to do that. So a less internally detailed profile is called for here. But our details are always capable of achieving our desired intentions.**

Just as with the construction drawings, the use of other types of drawings varies with the problems at hand. Sketches are used at all stages of a project wherever a conceptual problem is posed: **In the beginning of a project, of course, the whole is dominant over the parts. As one moves through the design process, various aspects of the project involve a conceptual attitude about the parts, but one which supports the whole. I think one's degree of success with detailing largely depends on the tenacity with which each of the various parts of a project are dealt with conceptually. The whole will take on a vitality as a result of the personality of the parts. In our buildings the whole is usually more dominant than the parts, unlike for example Scarpa's buildings. The parts of our buildings are usually subsequent to the whole.** Thus for Pedersen, sketches should be used throughout the design process, from the initial stages of conceptualization through the latest stages of design development.

The sketches themselves do not have any particular style that is representative of the firm, because there are four design partners in the firm and each works largely with a personal style of drawing. The lack of graphic consistency is also a function of the partners' feeling that the documentation of the process is of lesser importance; that ultimately only the building itself is important. **We do not set out to keep a record of our artistic process. Drawings, with obvious exceptions, basically convey information.** In a large firm like Pedersen's, he feels it is important to allow some leeway in the way that people draw. This allows for the maximum creative participation of all the members of the design team within a set of broad limits imposed by the office's architectural sensibilities: **Leading a design team requires that one has the ability to control yet at the same time allow a sense, not of autonomy but of meaningful participation by the members. If one controls too tightly and for example you tell people to draw in such and such style, it would tend to sap a certain individual initiative. It is important for me to have people who do not feel dominated when working with me.** The sharing of responsibility for the whole design process is very important to Pedersen. If the process is overly controlled by a single person, as it is, he feels, in some large American design firms, then the development of the details and the buildings is weakened: **While the contour and profile of a work must be controlled by a single individual, large projects require the great enthusiasm of a number of people who are willing to work with you. The only way you can create a large body of work of high quality is to give a number of people a sense of personal contribution to the process.** In his office, sketching is done by a great number of people in the design process as each confronts a specific conceptual problem in his or her own particular area of responsibility.

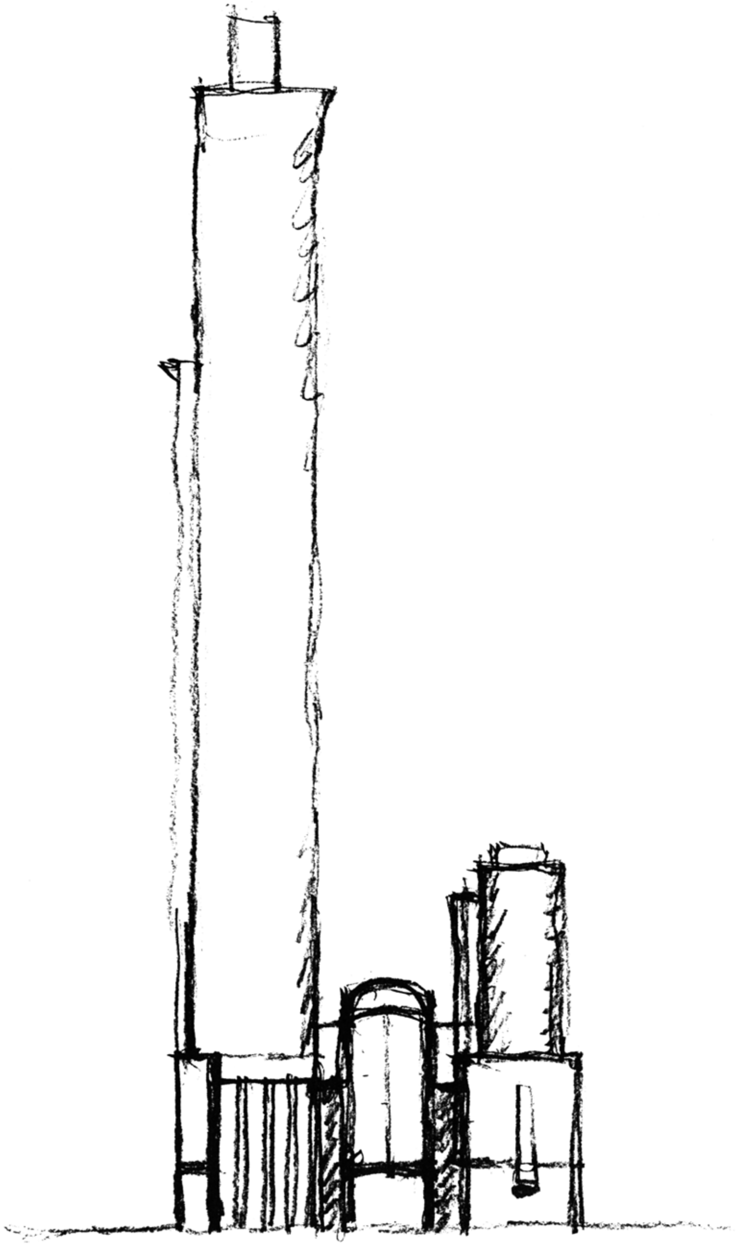
Plans and sections are used by Pedersen from the very beginning of a design project, with the plan the most critical of the drawing types: **It is the best vehicle of communication to myself. I use plan more exclusively than section, and elevation. Plan is initially a loose diagram, but it is very quickly—as soon as an idea is relatively completely conceptualized—put into scale. I can only develop ideas by immediately going to scale and working with a hard edge. Then I go back and forth between freehand sketches and precise drawings.** Sections are less important in office buildings where the interior biology of the building is known. As a result: **The section of the tall office building often doesn't have much complexity. The parts may have sections but the whole doesn't usually. But for most other building types the section becomes dominant because of their complex interior biology. Here a section and a plan become interchangeable.** Elevations are used, but mostly through conceptual models rather than drawing. In Pedersen's practice, the form of the building, if it is a large office building, is first established in model. Only then is the elevation fleshed out. Here drawings are used in consort with a series of models of the building.

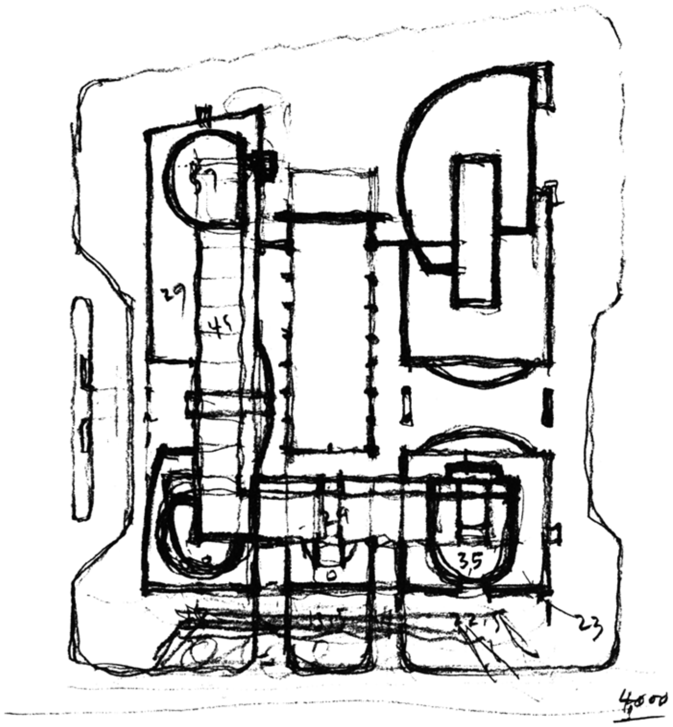
Axonometrics and perspectives are not an important part of Pedersen's armory of drawing techniques. He finds it ironic that he doesn't use such drawing extensively, because when he was young and first starting out he was well known as a delineator and did a large number of such drawings for his firm. While he thus feels he is good at them, he does not find such drawings useful given the mechanics of doing them.

Even when dealing with clients, Pedersen is more likely to present plans and sections, where pertinent to the design, and elevations, usually with models, rather than more elaborate perspectives or axonometrics: **The initial presentation to a client obviously involves the drawings that describe the organization of the project. So they tend to be plans and sections. At the point where we are ready to present the surface attitudes for the project, we usually use large models with elevation drawings accompanying the models. We rarely use drawings alone to communicate because we find that clients do not have the ability to read them. So we work largely with models.** There are drawings that Pedersen feels it is inadvisable to show to the client. These are drawings done for communication between members of the design team and would confuse rather than enlighten the client, as they rely on an ongoing knowledge of all the aspects of the design process and the ways drawing is used in the office to communicate that process.

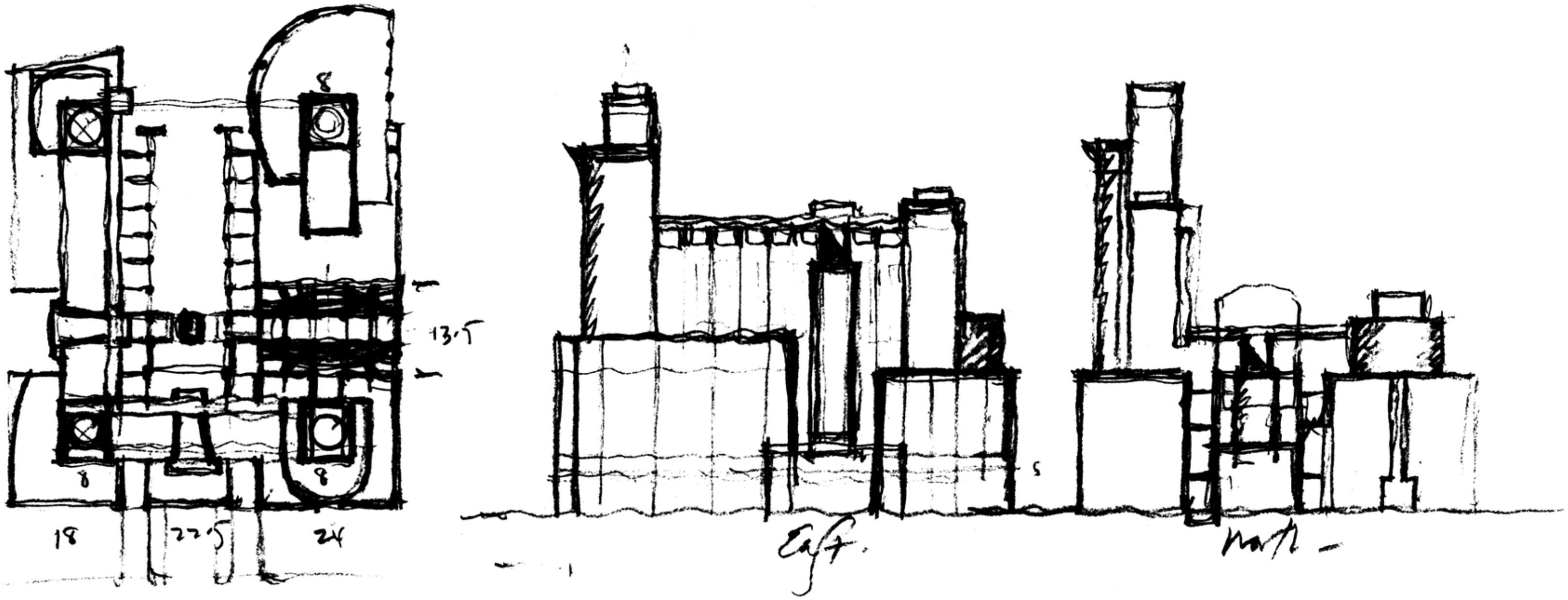
When working with people outside the firm, the type of drawing used also depends on the issues and situations being confronted. The kinds of competitions Pedersen enters mostly involve developers, and for these he uses models for presentation purposes. For other types of competitions, for example for *Progressive Architecture,* he will use more graphically appealing documentation. With engineers, who are always brought in at the beginning of a project, the kind of information conveyed has to be very precise. The amount of information on any construction drawing is defined by the nature of the working relationship with the contractor, each of whom also does drawings to document his role in the project. With the public, Pedersen finds it is crucial for the office to do graphically appealing elevations and drawings, **although if I had my druthers I would rather just show working drawings because they are much more interesting, especially where you have craftsmen who know how to do them. That is also a real art.**

Recently, Pedersen has begun to design important buildings abroad. The Westend Strasse D.G. Immobilien Anlage-Gesellschaft in Frankfurt is one of these. Pedersen began this building with a number of conceptual sketches and models in January 1987 for a competition the office had joined (figures 106, 107). The first sketch is an after-the-fact recollection of what was an early overall conceptual impression with which to guide his thinking about the building. Five days later he drew the second sketch as a conceptual plan and elevation study. As he worked through his ideas over the next week, more detailed conceptual plans and elevations began to emerge in his sketches (figure 108). These sketches were then turned into more rigorous and precise specifications (figure 109) for the execution of a plastic presentation model for the competition.





William Pedersen *Kohn Pedersen Fox*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After the competition was won, the design was developed through sketches and more rigorous drawings. In July 1987 Pedersen produced an important conceptual study for the development of the building using words and images (figure 110). By August, more rigorous studies of the building complex were under way, as in the study of the elevation for the low building in the project (figure 111).

After a period of development, a number of more detailed studies were executed, such as an axonometric study of the roof crown of the taller of the two buildings and the loggia of the lower (figure 112), drawn by William Davis in August 1989. Another is an axonometric study of a detailed resolution for what would become a *Wintergarten* (figure 113), drawn by another architect in the office, Jane Murphy.

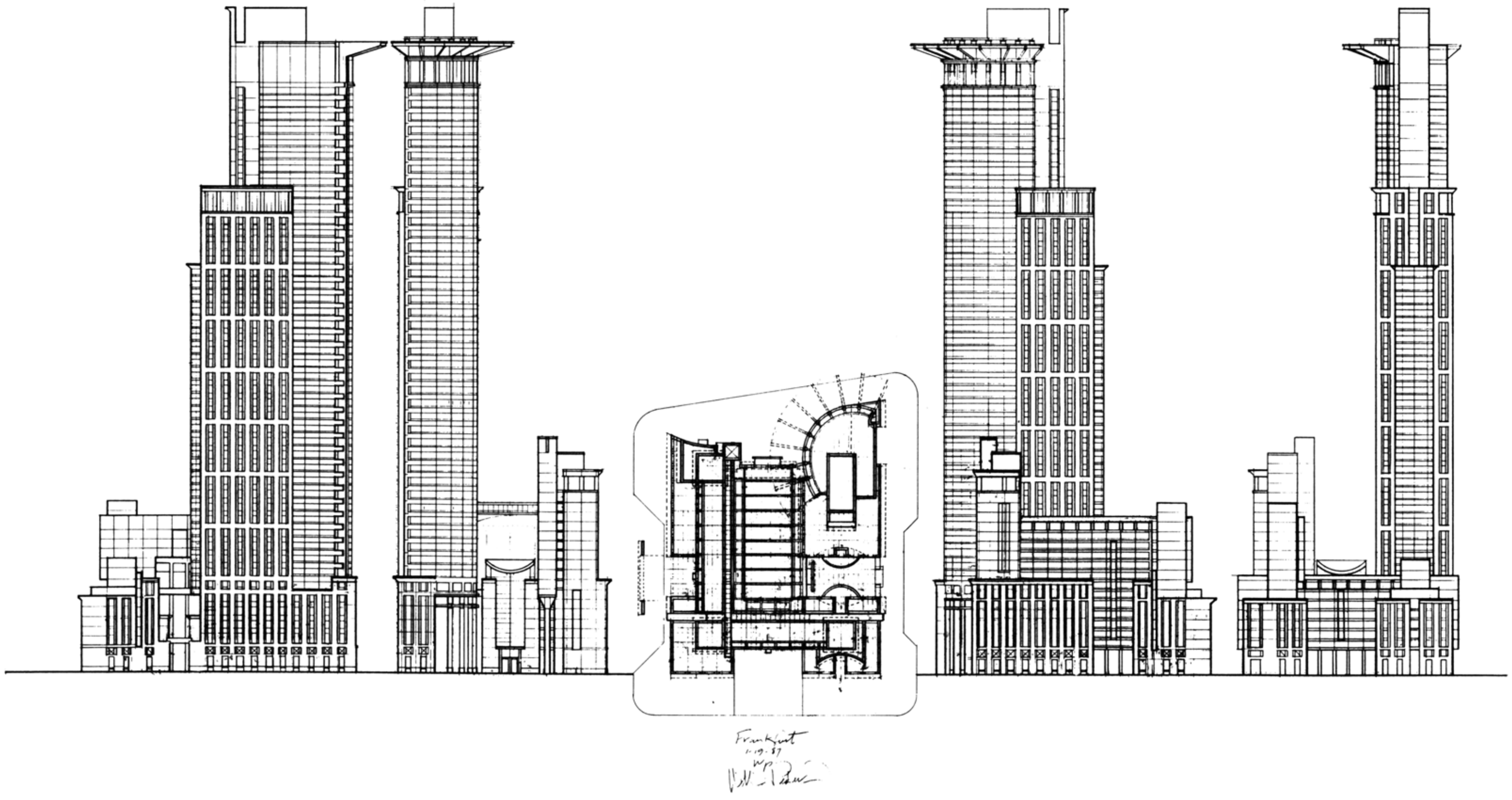
After the design was developed, a series of construction drawings were produced detailing all aspects of the building. Figure 114, drawn by Andreas Hauser in December 1989, is a construction document detailing the mechanicals on the 51st floor, while figure 115, drawn by the same individual during the same week, details the construction for the crown tower developed above (see figure 112). Figure 116 was drawn by Wolfgang Neumüller and Andreas Hauser to guide the construction of the columns for the *Wintergarten* (see figure 113).

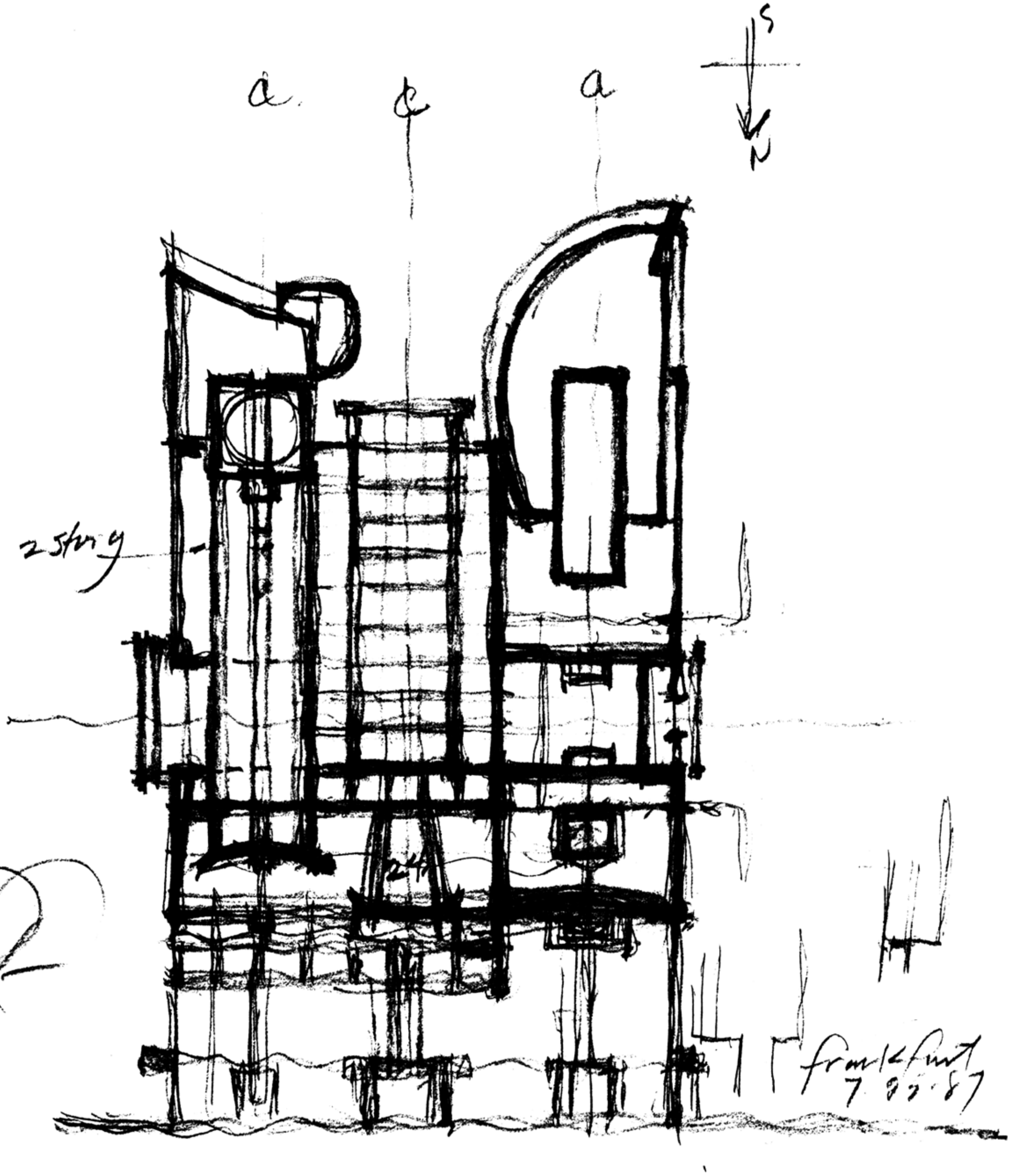
These drawings were accompanied when the design was complete by a number of presentation drawings, which were used to illustrate the building for publication as well. Figure 117 is a presentation drawing for one of the elevations, done by an anonymous architect for presentation in 1989 and then updated for publication in 1991.

In 1991, Helmut Jacoby was commissioned by the office to produce one final rendering of the building for presentation and publication (figure 118). Moreover, a poster was made of a conceptual representation of the project done in color in 1988 for Pedersen's own personal drawing collection (figure 119)—a kind of drawing he enjoys doing at the end of his project.

For William Pedersen drawing is an important part of the process of making architecture, but it is only one form of representation that he sees as critical to his design process. Models too are critical, not only for presentation but also for his own sense of the building. And for Pedersen, unlike for many architects, drawings are merely tools. The best representation of his architecture is the buildings that the drawings help to make.

109

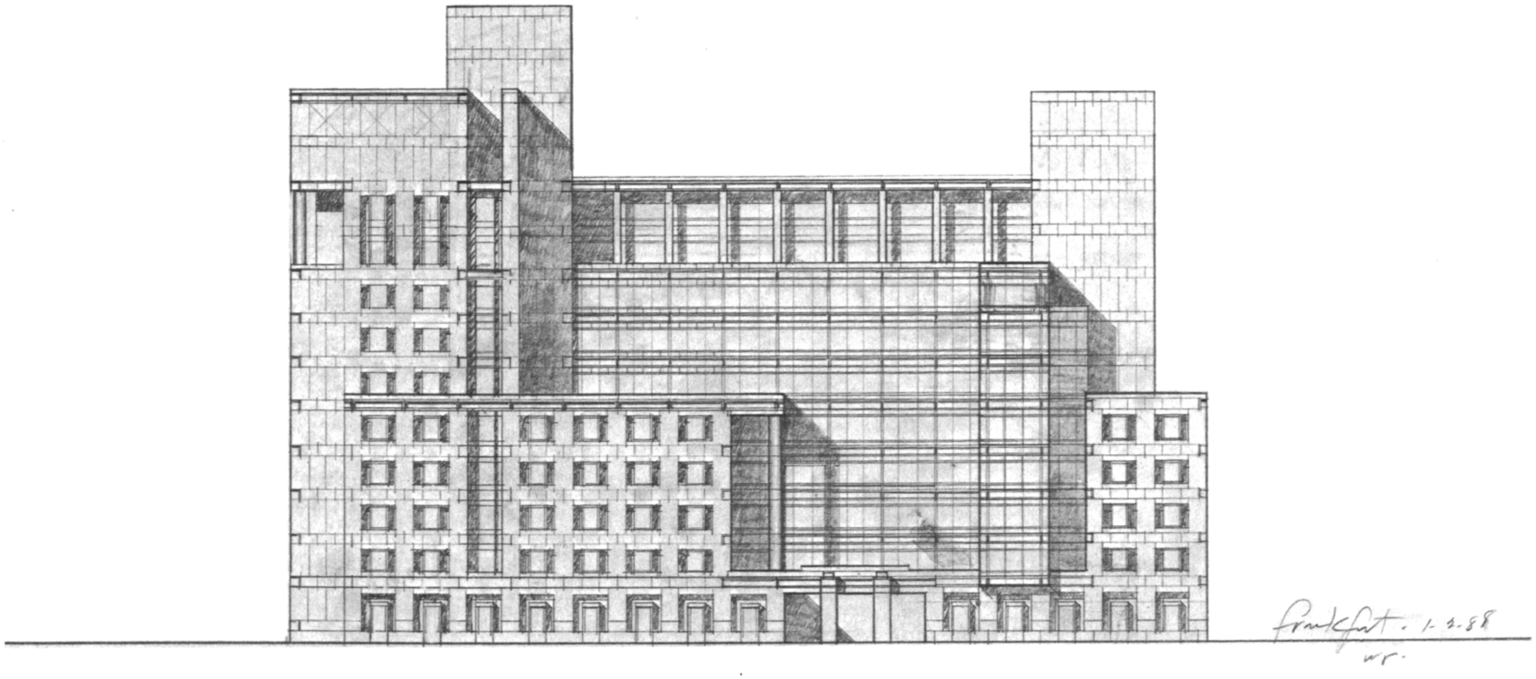


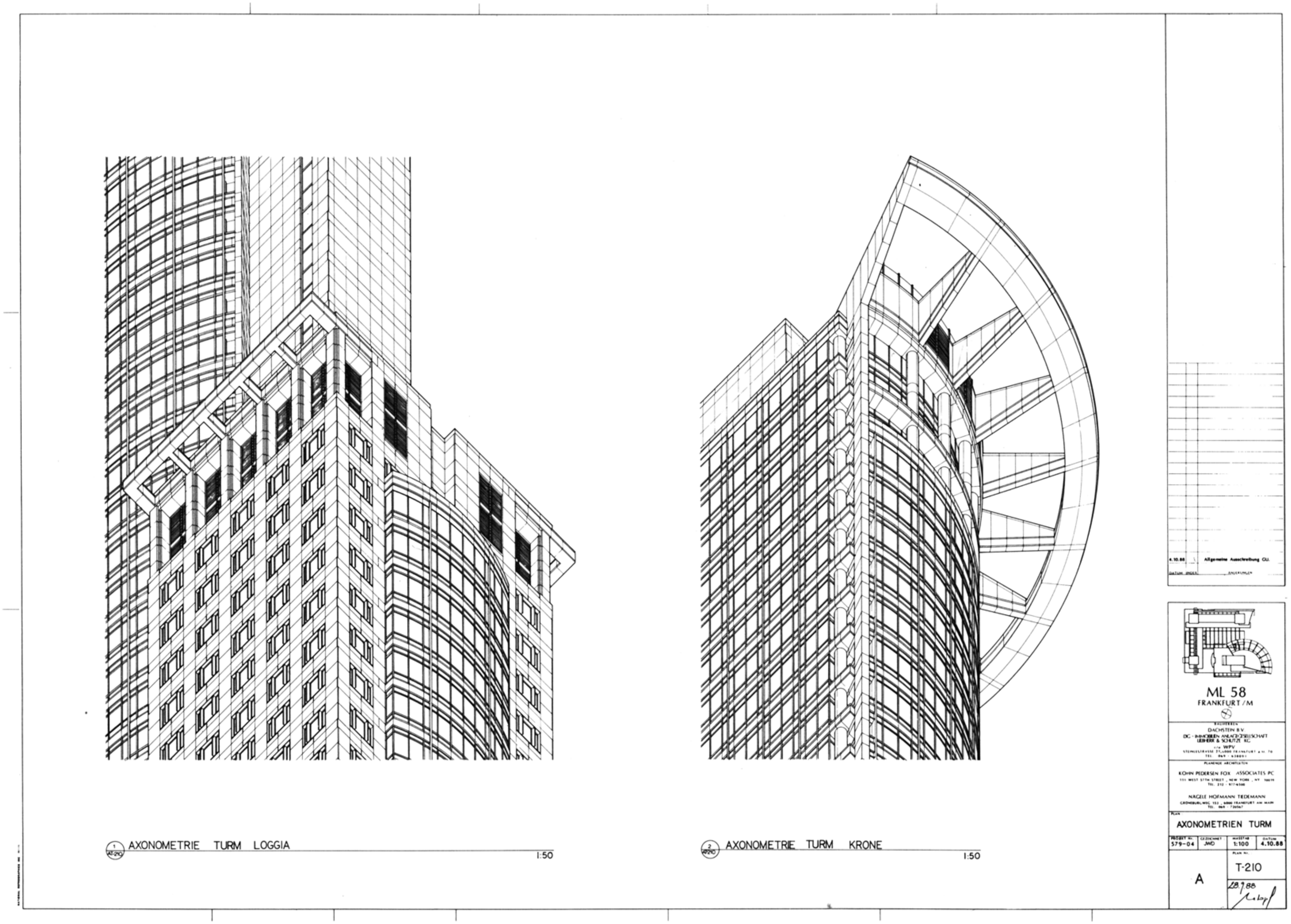


110

William Pedersen *Kohn Pedersen Fox*

111

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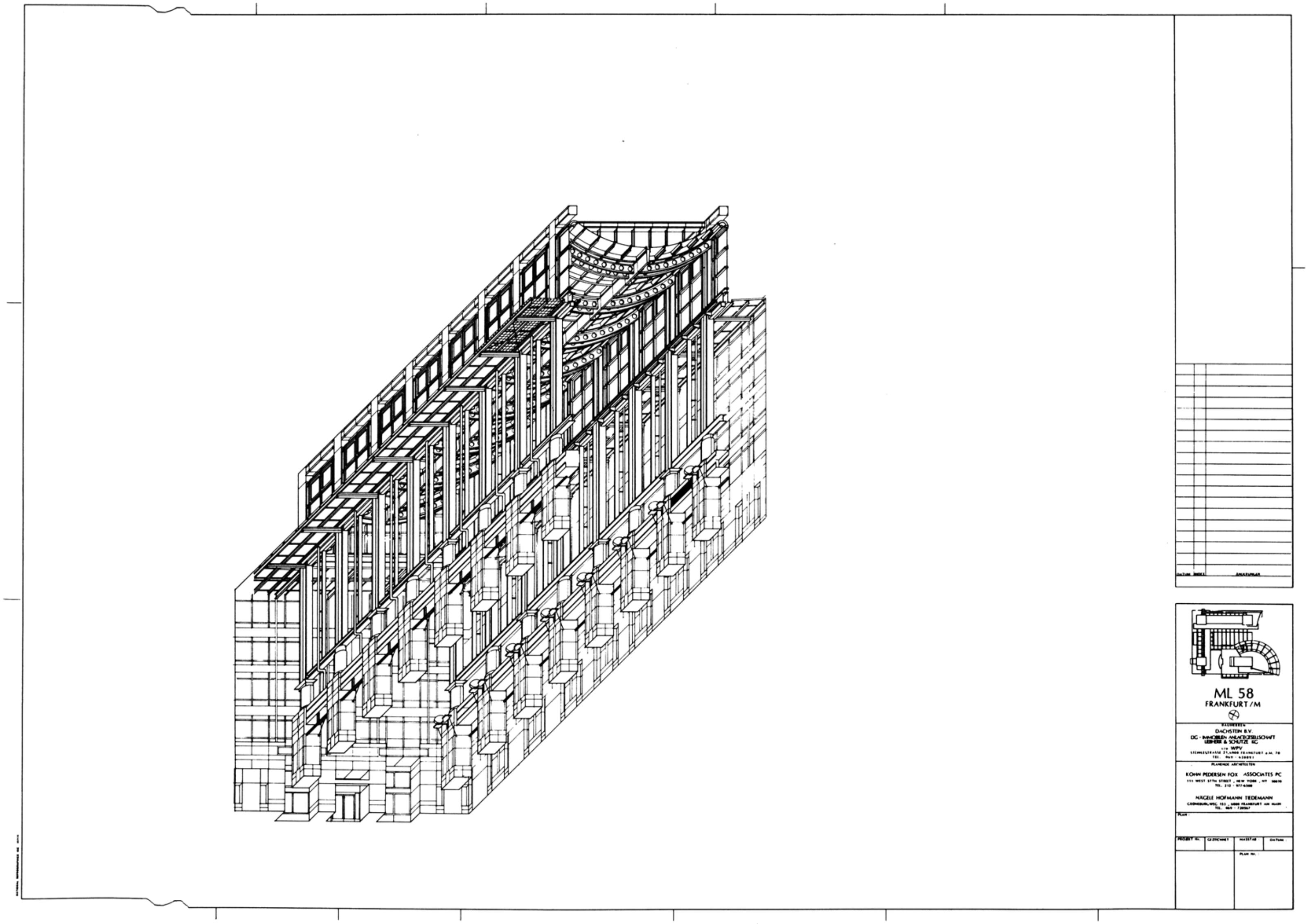
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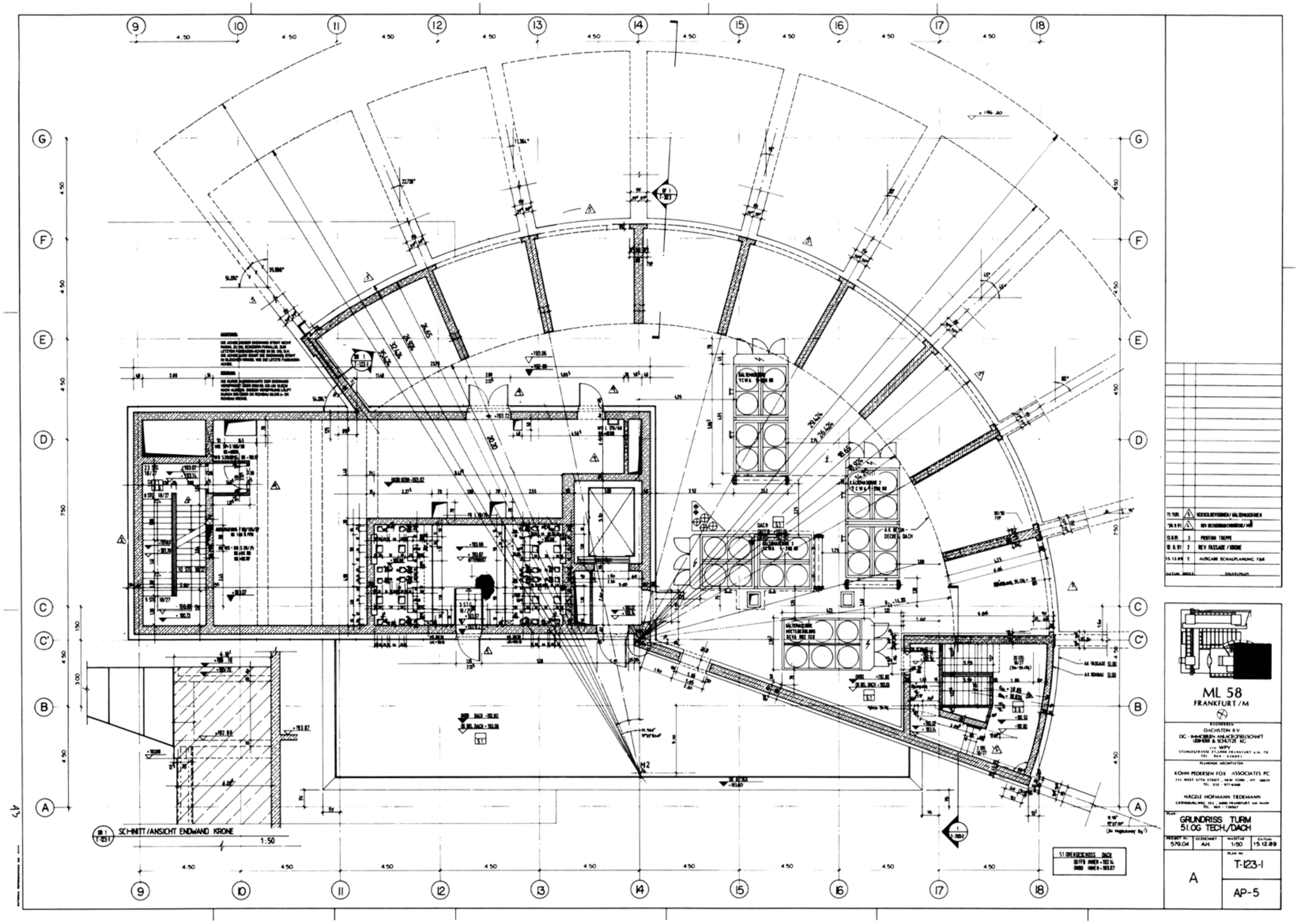

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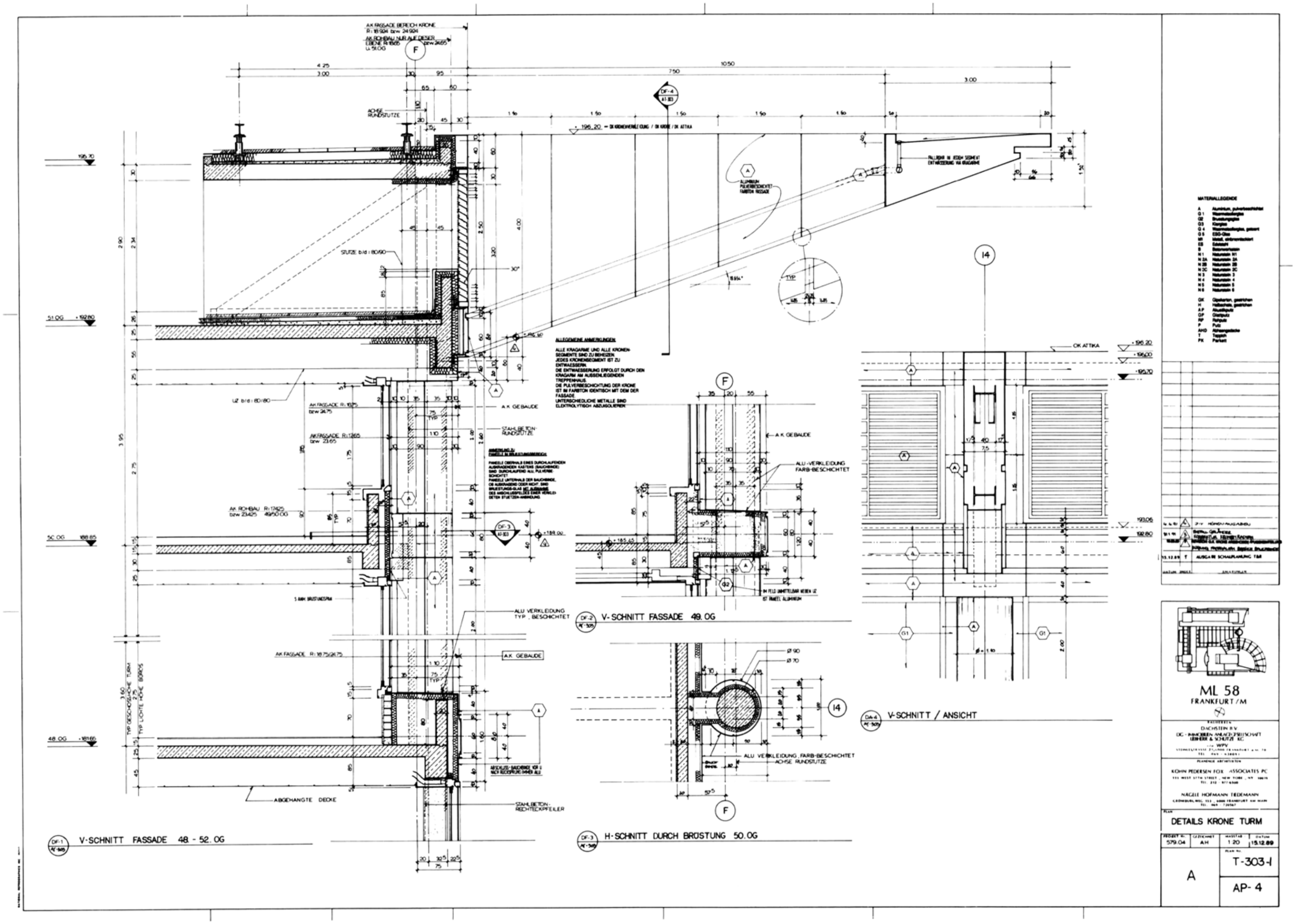
William Pedersen *Kohn Pedersen Fox*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DIE PULVERBESCHICHTUNG DER KRONE IST IM FARBTON IDENTISCH MIT DEM DER FASSADE.
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ALU VERKLEIDUNG, FARB-BESCHICHTET ACHSE RUNDSTÜTZE
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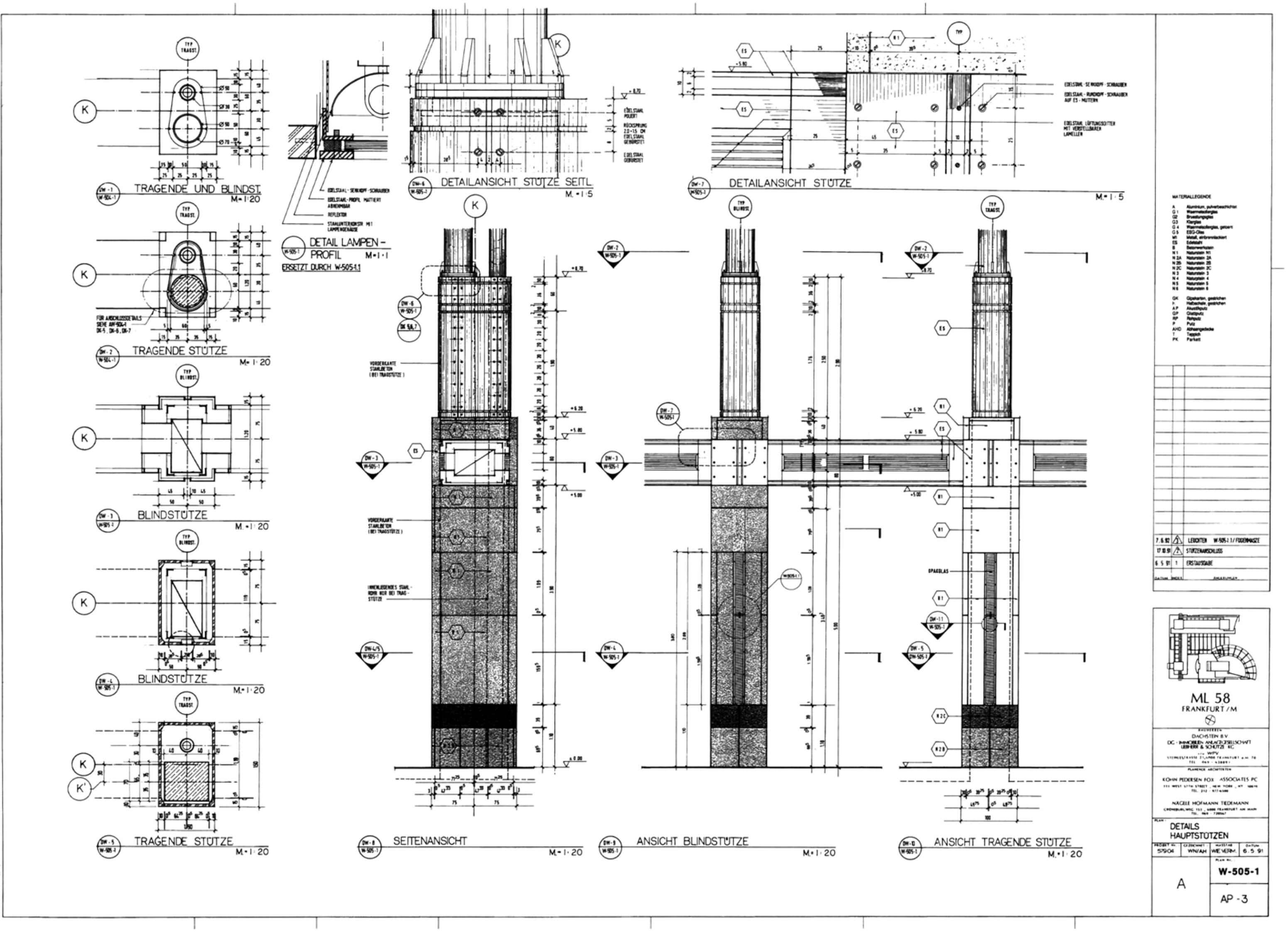
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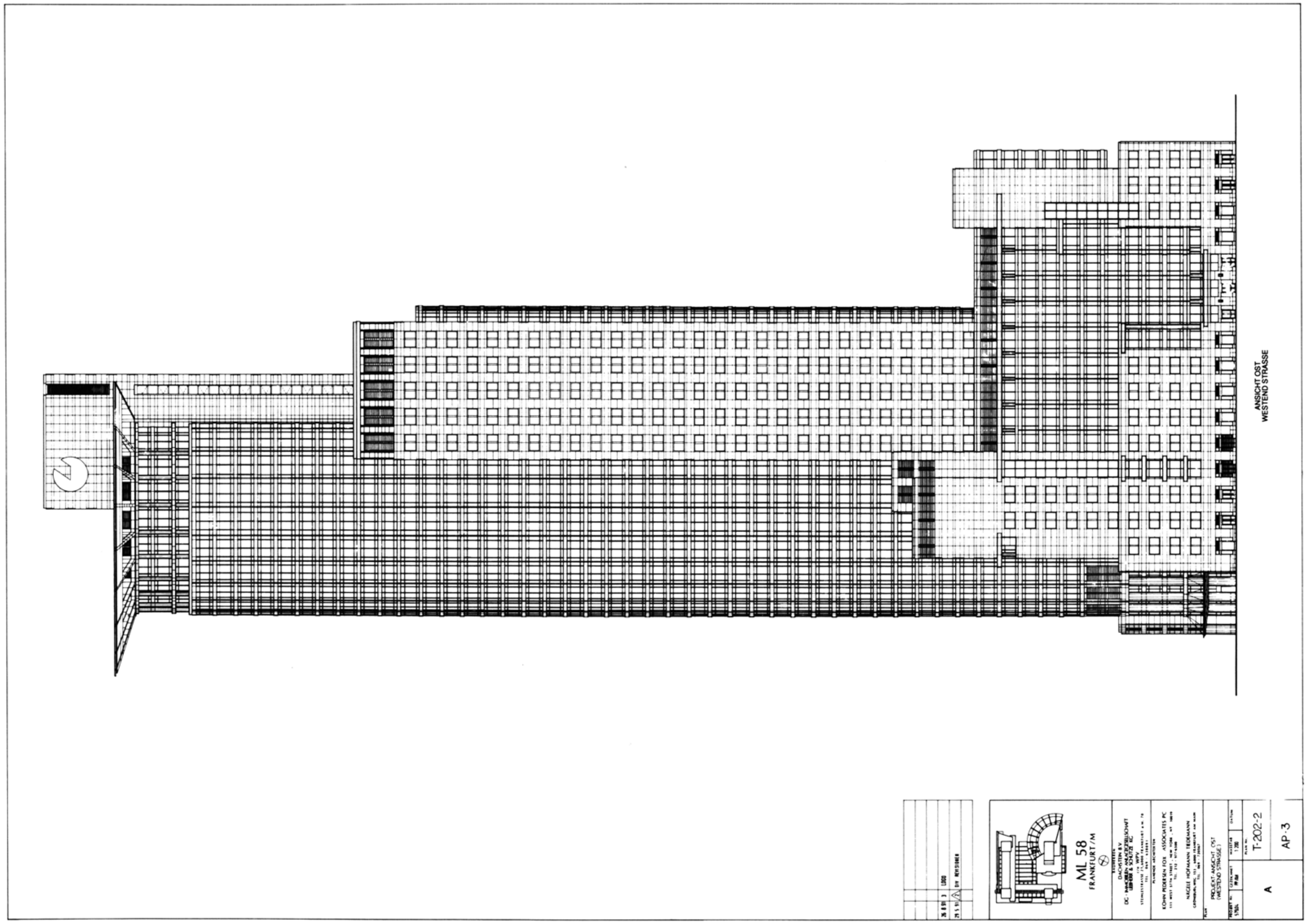
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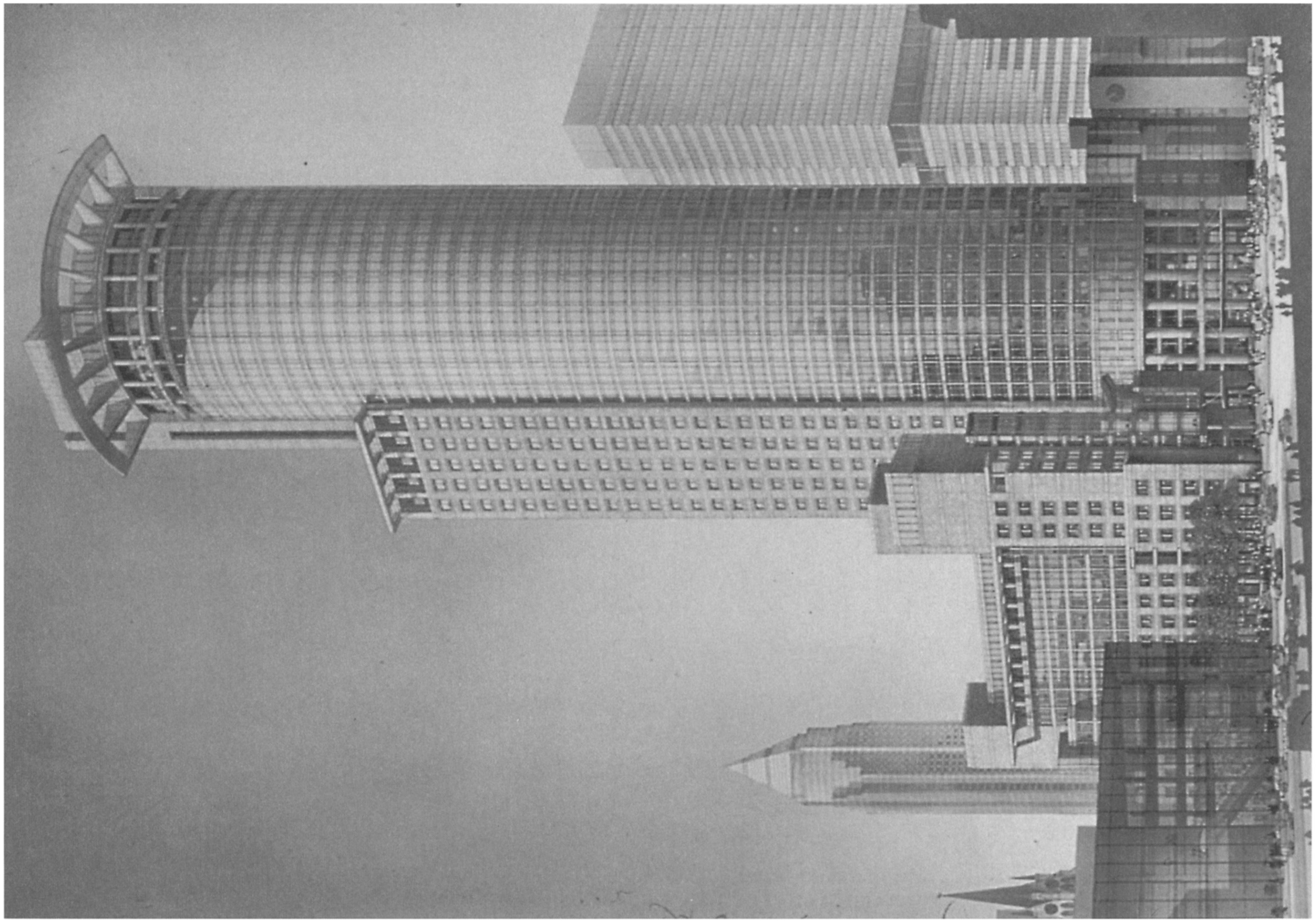

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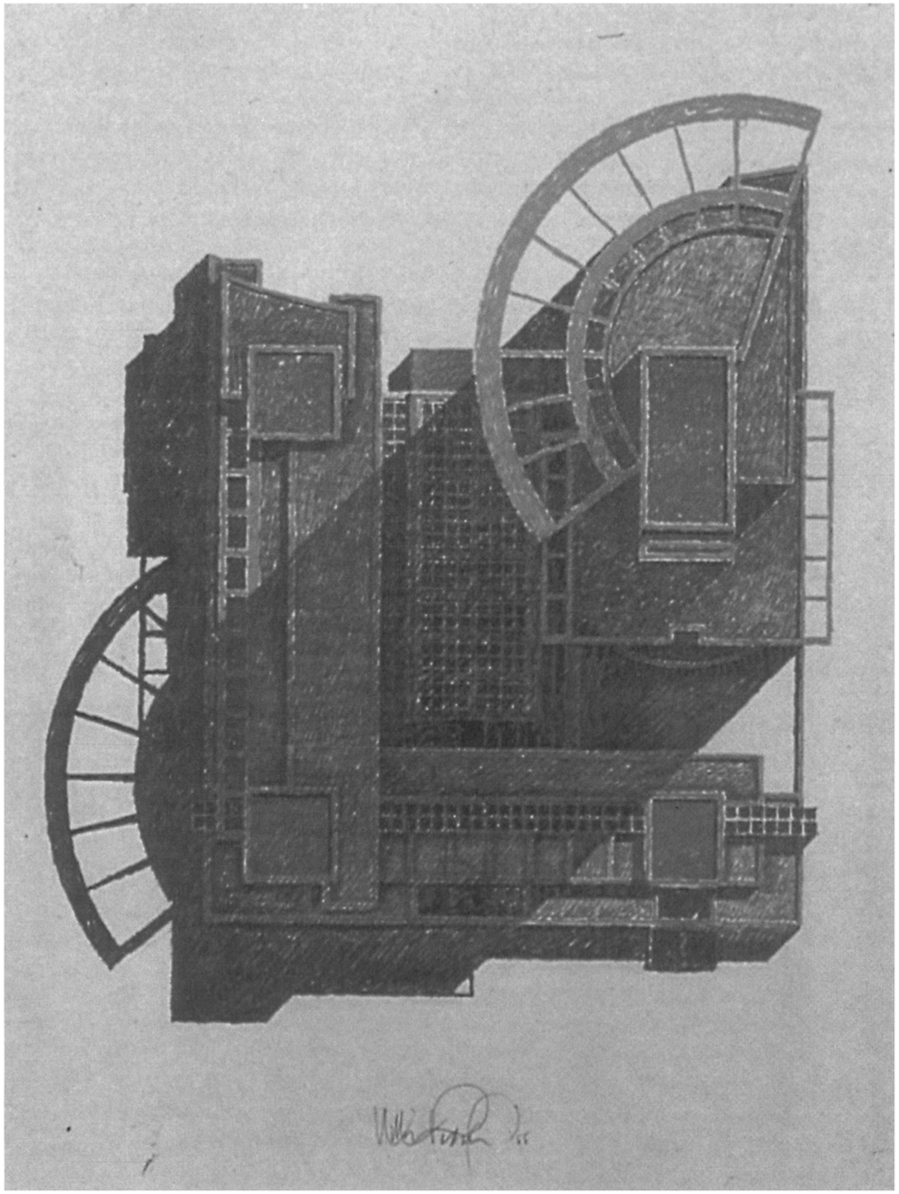
William Pedersen *Kohn Pedersen Fox*



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Academic, critic, a much-published and well-respected practitioner, the former head of the Department of Architecture at the Graduate School of Design at Harvard, and head of Rafael Moneo Architect, an office of ten people in Madrid, six people in Barcelona in partnership with Manuel de Sola-Morales, and four people in Cambridge, Massachusetts, Rafael Moneo is rapidly becoming a major figure in the architectural world. For him, drawing is a central part of the architect's world and his way of seeing and acting.

Drawings for Moneo are the basis for much of architectural thinking and are an essential instrument of architectural communication both within the field and with those outside architectural practice: **Drawing is an important tool that architects use not just for showing to others or for establishing the physical presence of an idea but is also the way architects think.**[5] If we start with the history of painting, Moneo argues, we see the entire history not only of the object but of ways of thought. Today critics have done much to allow us to see the way any representation helps us understand the world of ideas of which it forms a part. Similarly, drawing defines a whole new way of thinking about architecture. And, as building has become more complex, drawing has become a necessary part of the way architects think.

In the Gothic period, Moneo points out, drawing was not so essential to architectural thought and practice: **Probably in the Gothic the architect did not work so much with drawings. Probably they had a clear idea of the structure of the building so that they could, without drawing, master the whole of the production of building.** If drawings were used, they were not so much about the conception of building as they were templates used to craft the building. It was in the Renaissance, when architects became a bit more disengaged from the actual production of the building, that drawing became important. As a result, the building took on a more generic quality as an object. This shift in the role of the architect and the emphasis on a new instrument of architectural production is well illustrated, according to Moneo, in the letter that Raphael wrote to the Pope: **When Raphael starts to look for a new way of representing architecture, it's because the complexity of the building that results from new self-possessions of the building on the part of the architect requires drawing as a new means of representation. These new means are what have become so essential now. Raphael in his letter states quite clearly how perspective wasn't enough for controlling the new building. For that architects needed a more and more complex system of representation, a system of geometrical description of the building that has prevailed until now.**[6] Since this shift to drawing, Moneo posits, drawing has become almost an innate ability for the architect: **In a way drawing has been almost continuously related with the architect's formation. . . . And it is true that drawing, or being a good draftsman, could be**

considered almost a necessary characteristic for whoever wants to be an architect.

As a visual art, architecture demands of its practitioners a visual sensibility and a visual education. Drawing, for Moneo, is the instrument that gives one this visual discipline: **Assuming architecture is also critically a visual art and therefore a visual activity, then you need a visual education. This visual education gives you a certain discipline in your eyes and in your hand and both come from learning drawing. Drawing helps you explain yourself and is a way of helping you give a sense of the scenes, to see the corporeality of the scenes, to see what shadow means, what a blur means, to see how things are seen in a close view and in a long-distance view. This visual education is provided by drawing. You need this visual education.** But for Moneo, drawing is more than just essential to architecture, it is a critical part of the very development of science and modern mechanics and industry: **Drawing has been associated with the Newtonian idea of mechanisms. In a way, traditional physics has tried to draw for description. If you take something like Diderot's *Encyclopedia,* drawing plays a crucial role. It means that whatever you are able to treat scientifically you are able to draw.** This relation between science, technology, and the drawing is seen most clearly in the drawings of machines and their parts that illustrate how the machine works. The connection between analytical thought and imaging is for Moneo a crucial part of the development of industrial society. This is critical for architecture, because in a way the building itself is a form of machine.

In the same way today, as Walter Benjamin argued,[7] Moneo notes that contemporary society is also crucially bound up with the use of the image whereby culture becomes "more a culture of reproduction than a culture of production." Moneo sees this notion as a kind of prophecy for architecture, because as the problems of building production become less and less important the imagery of the building has become "destitute": **Those who still adhere to that part of the traditional approach [to design] and the old ways in terms of the discipline, and believe that one recovers the image of the building in relation with its construction and not only with an image that is about external appearance, are fewer and fewer.** Today, Moneo feels, there is too much about image and not enough about construction and the materiality of building in much of contemporary practice: **This creates a strong disassociation between the idea of building created with its construction and its image. We are moving more and more to a world of phantoms than a world of materiality.**

Drawing enters his own practice because it can serve so many of the designer's needs: **It is the easiest way of advancing what your ideas about building are about, what the building is going to be, very much from the very beginning. Drawing can be used to form many different**

intellectual attitudes. I mean a drawing can be very much a preview, a very first view, a feeling of everything that is going to be. That very first drawing can serve as an image of the idea as well as a reflection about the constructive principle upon which everything will be based. What is important to note, for Moneo, is that drawing is a versatile instrument that does not proceed in the same way for each project: **There are moments when you know the project that you are going to do is related with others and you are able to project the typological approach and say that "this building will look like those others that I know." When that doesn't happen, then the architectural drawing could be something different. It could be a first insight into what the problem is. There you are trying to do a reduction that allows you to intervene in some reality and say, for example, "well, that's the thing for an urban problem." Then I am not just thinking that the problem is going to be solved by applying a typological or previously known idea. It is much more about trying to figure out some insight and to anticipate and then give an answer to the problem that you see. That produces a different kind of drawing.**

For Moneo, drawings are important from the very inception of a building. What specific type of drawings he uses, whether section, elevation, plan, or sketch, varies with the problem at hand. Whatever the type of drawing used at the beginning of a project, the drawings **are more general, global ideas in a way. It is very rare that the building appears as a set of elevations. When you have a building, you need an understanding of the site, the program, how you are going to approach it, and that is a nebulous and atmospheric feeling. And very often the first drawings of the building are more unclear [than they will be later]. You envision how you think a certain mass, or a certain structure or certain order, will afford the building. Then you start to prefigure what the building will be and you try to test your building area with what the actual, very specific demands of the building will be. These demands, or really I think requests, are the requests of the site, the requests of the program, the requests of the material you are going to use.**

And you need to check these very nebulous ideas vis-à-vis all those other realities in the drawing. The clear manifestation of an elevation, a plan, or a section comes later as the result of trying to figure out exactly how the physical reality of a more general reality will happen. The drawings Moneo uses at the beginning of a project are defined by the project. For example, in his design of the Atocha Railroad Station in Madrid he began with the plan, while for the Wellesley Museum he began with a section. The initial drawings vary with the problem to be solved. But as Moneo noted above, and emphasized again, before one begins with any type of drawing one needs to get a more general sense of a solution: **Initially the idea of a**

building begins with a more general idea of the solution that in a way advances the complete solution, although I don't like to pin buildings on some idea that you find. Instead you need to master a bit the way you anticipate a building from the very beginning. Then you work steadily and continuously, but I won't say that the building is a result of the process. I always have an argument with that way of thinking. I don't think the building comes out of the project. It seems to me it is something previous to the process that implies the immediate translation into that process of the right form of the building—the right of the building is first in a way. So for Moneo the idea of the building first develops in the mind's eye, and one then draws to develop the imprecise and "yet powerful" idea of the way the building should be.

Each type of drawing, for Moneo, has its specific use, because each drawing type portrays its own specific vision of a building. Axonometrics he uses because **they give a certain primacy to the object because, in a way, they are a representational convention that one can use to draw things regardless of the position of the viewer. [Axonometrics] describe the way parts are connected.** For Moneo, the capacity that axonometrics have for revealing the building as a construction of parts and the way they allow for "dismembering" a building make them a very useful tool. They can be used both at the beginning of a design project and also later as an analytic instrument that tells you how the parts or elements of a building fit together: **This in a way is the most descriptive system to know how a building is built. It is very different because it allows you to see the building very properly. It allows you to see the timing to be used for construction; you see all at once how the entire process of construction will happen.** Sections, plans, and elevations, while the primary tools of the architect, are used perhaps a little too much in design, Moneo argues. For an alternative, Moneo points to the example of Frank Gehry: **One of the most remarkable architects, Frank Gehry, tries to work independently of those established mechanisms to think architecturally. For him, architecture is much more the result of just putting parts together without considering that all the elements are going to conform to the unity given by the section and the plan. The unity comes from considering the different elements that constitute the object. You have a clear example of where the plan and section are needed in Gehry's work. He draws those later because they are the conventional way of architecture but not because his method resides in the drawing. Peter Eisenman, for instance, is somebody who still works a lot with plan and section. I work more with those conventional elements because I still see the building very much contained in a skin. I see a building that's plan and section. That is something that Gehry doesn't.** While Moneo is willing to accept some of the criticism about how plan and section might limit architectural design, he still feels that they give a very clear "reduction" of what the body of a building will be. While he wouldn't want to argue that there is no other way of thinking about buildings and architecture, he would argue that it is still rather useful to think about them in terms of plan and section.

Moneo also uses perspectives, but not as renderings that depict the building to others: **I think the most useful thing about doing the perspective is not the result of the perspective itself. It is not in the ability to explain to others what you are trying to do. It is a much more painful drawing that allows you to identify many problems. That is what doesn't happen with the computer. The computer gives you images immediately and doesn't give you time to say "well, here is where I am going to have something, etc."** The process of drawing rather than the drawing itself is what is critical to Moneo. Therefore the most useful perspectives are those that help you understand and visualize how the building you are designing will be seen. But no drawing is always essential: **There are some projects in which you can go away without drawing a perspective. Very often the sketch will give a more clear perception than a perspective. The perspective has something very artificial in it so they are not completely successful [as a visualization of the building]. Of course perspective is a very sophisticated mechanism for representing points of view for the viewer. But there are points of view, there are ways in which buildings dispose their presence, that are not caught by the perspective. Very often the sketch is closer to how the buildings will be perceived than the perspective is.**

Whatever drawing Moneo uses, it is always related to the problem at hand. He does not have a specific order or method for using the various types of drawing available to him: **I try to be freed from following any specific method. I do not always do a design problem the same way, although probably most of the time it is the same.** The drawing is most often the place where his thinking about a project becomes a formed idea: **Very often it happens that on a page things come together.** Nonetheless their best use is instrumental: **I am not making a collation of my own drawings, and therefore I am more able to work with them in a rather instrumental, direct way. I wonder if I kept out documents, whether I would introduce new things which in a way would harm the way in which I like to relate to drawing.** When working with clients, the same rule holds: the drawings you show clients depends on the problem or issue at hand. As a general rule, Moneo will show clients about as much of his work as he can: **I try to be very open with clients. For instance, I am reluctant to charette, I hate charetting because I try to keep my relationship with clients open at all times and I like to allow myself the possibility to show the client whatever I have at the moment.** Clients, Moneo feels, should be allowed to see the work as a real ongoing problem that the architect is trying to solve. For that reason, he prefers to present them not with presentation drawings but with the actual drawings of the moment; drawings he is using: **I think that is better. I want to share with my clients what my problems are, where I am in the design, and why I am doing the things I am.** And that is done with drawings and models for Moneo.

Even for competitions where one has to sell oneself and a more striking representation is conventionally called for, Moneo feels it is necessary to resist the temptation to use such drawings: **I would like to present myself to whomever more globally, more through my entire way of approaching things and not just with striking presentation drawings. I don't like to have strong differences between my drawings for any project and so I try to avoid the specific language called for in competitions.**

Even in his own practice, Moneo does not use renderings of his projects very often. He does when he has time, as he enjoys drawing watercolors of his projects, **but that comes as a result of my love of thinking and my interest in testing myself whether or not I am able to communicate to my friends my ideas through painting.** In the office, Moneo likes to be surrounded, he says, by people who are able to do generally what he is able to do. In the process of design, he hopes others in the office will give him suggestions and think about things in ways that he has not. This is because as the firm takes on more and more work, Moneo finds it impossible to stay completely involved at all times in all the projects the office has. **I try to tell the people who work for me what I am looking for. In a way you need to be involved all the time because the process of architectural creation demands patience and is quite laborious. But obviously when you have four or five projects going on at the same time you don't have time to be at the tables with the drawing. It is very painful to lose this contact because you don't see the whole process, only the reward that is given by it. You see the result, and you judge the work.** In working with the others in the firm, Moneo likes to sketch and **very often work with the drawings that they [his assistants] are doing. Normally I like to intervene directly.** When dealing with people outside the firm, he prefers to use the same drawings he has produced in the design process: **As I said [about competition drawings], I am trying to resist a bit to be taken for some market goods, and although I realize I am in a market I try to present myself more globally and more completely than I would if I used just presentation drawings for the public.**

Most of the drawings that have been published from my office are the same drawings with which we have been working with builders and authorities. I try not to establish differences between those [drawings] that are going to be published and those drawings that are

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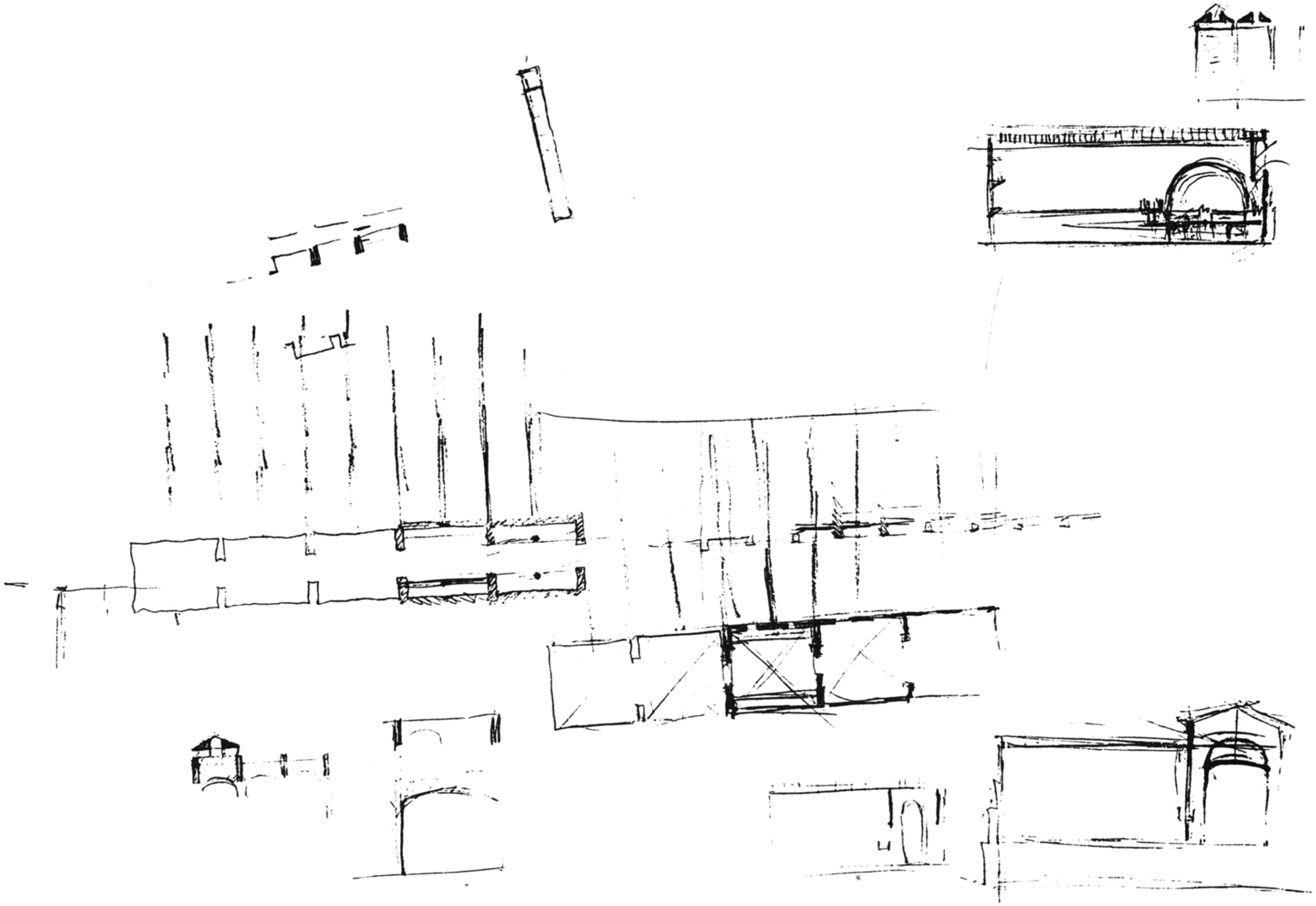

just a product of the communication within the process of production. But the medium of print does force the architect to think about how he can best be represented in publications. Sometimes, as a result, some special drawings are necessary. **But not too many. Of course you need to be specific about the use of special drawings. For instance, I used to draw most of my drawings with pencil. That is the only way to draw beautifully. I mean pencil allows you to enjoy this softness that drawing should have. Working with paint will require working with almost ancient techniques, things that architects don't do that often. In general, paint is a harder medium so I like pencil, but of course I realize that I have failed many times in sending pencil drawings to magazines and then being published not so properly. Now we are trying to draw some of those [pencil drawings] in ink for the sake of publishing, but I try to keep pencil drawings. And if the publisher is willing to use pencil drawings it seems to me much nicer.** With engineers and builders, Moneo gives them the same quality of drawings as he uses himself. He prefers in return that the engineers and builders spend the time to produce similarly beautiful drawings. At times, when they do, Moneo's office will retrace and redraw their drawings to provide the quality of drawing he feels is necessary to good architecture.

In the final analysis, this emphasis on the craft of drawing comes from the belief that craft must be a part of the whole process of design and building. This care for craft and for beauty must start at the very beginning of the process of design and be kept all the way through that process. As drawing is essential to design, it too must always reveal a sense of craft and a sense of the qualities of beauty that in the end one wants one's building to show.

This commitment to drawing as an essential instrument of architectural thinking and communication is embodied in the drawings that Moneo has produced for the National Museum of Roman Art in Mérida, Spain. The narrative that he provides as a guide to those drawings provides further testimony to his commitments.

An early sketch for the museum (figure 120) emphasizes and examines a number of issues. First, it demonstrates the importance that needed to be given to the two remaining Roman buildings in the surrounding neighborhood. Second, it reveals the importance of the scale of the dense neighborhood for the design. Third, while the alignment of the walls was clear from the beginning, the connection that was to be made between the theater and the amphitheater appears more problematic in the sketch. What eventually would become a courtyard between the administration wing of the museum and the workshops and galleries was as yet indefinite in this sketch.

Figure 121 consists of a number of initial sketches for the design. The system of walls appears as a dominant

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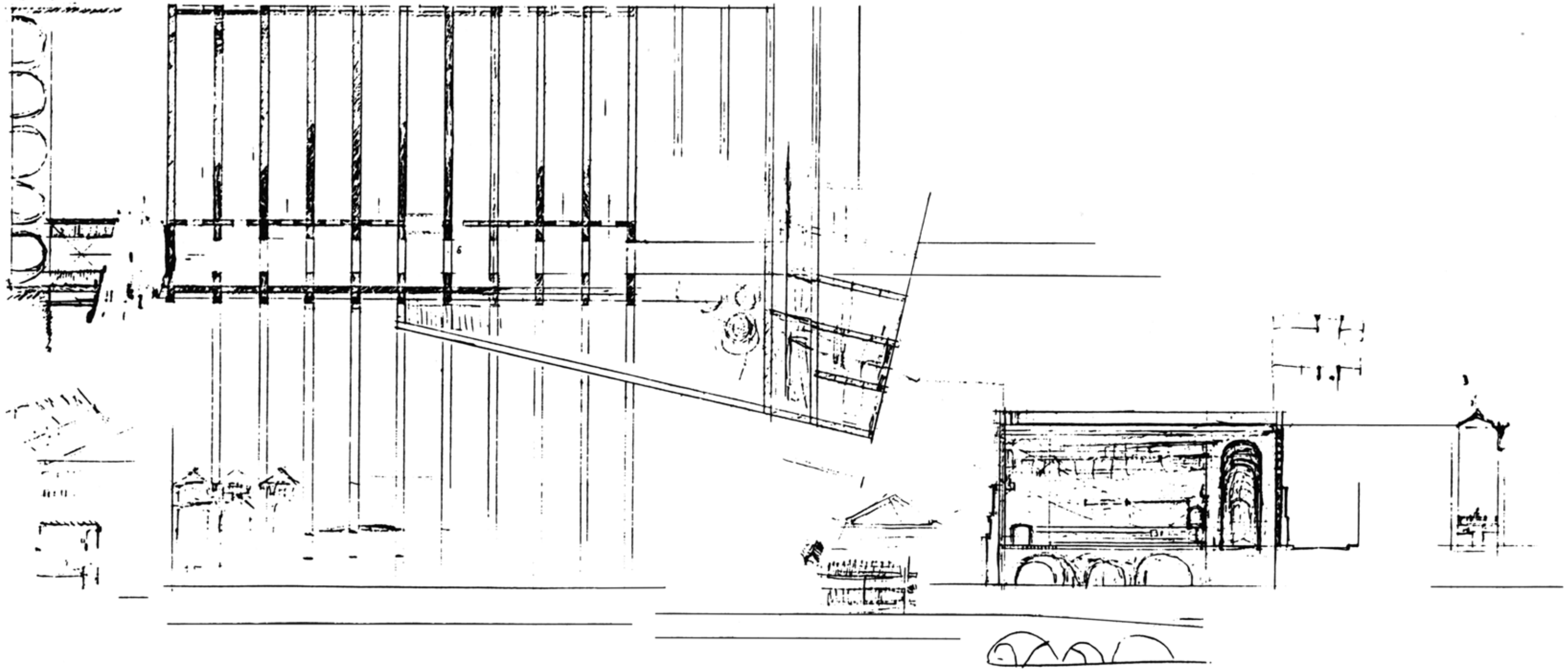

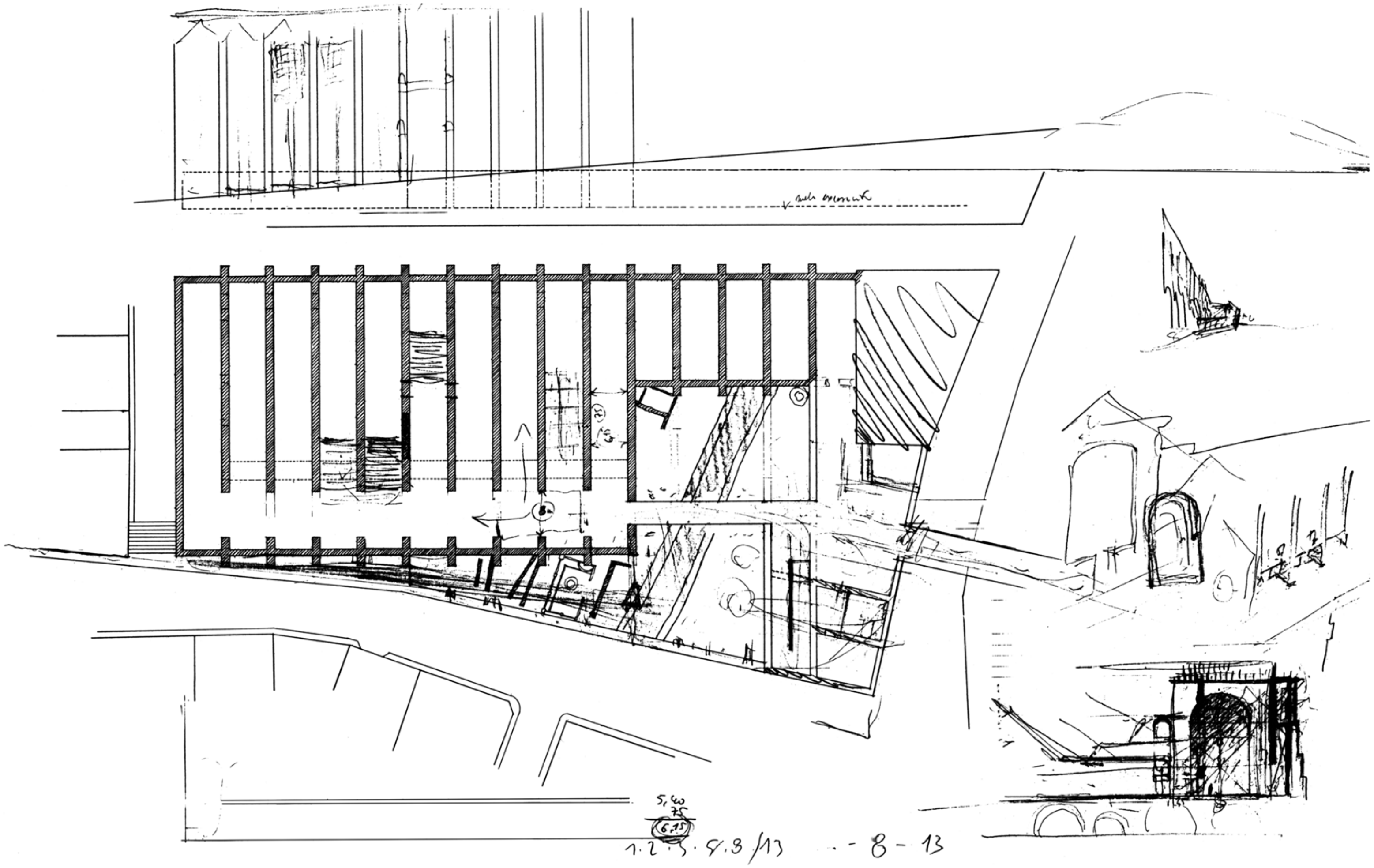
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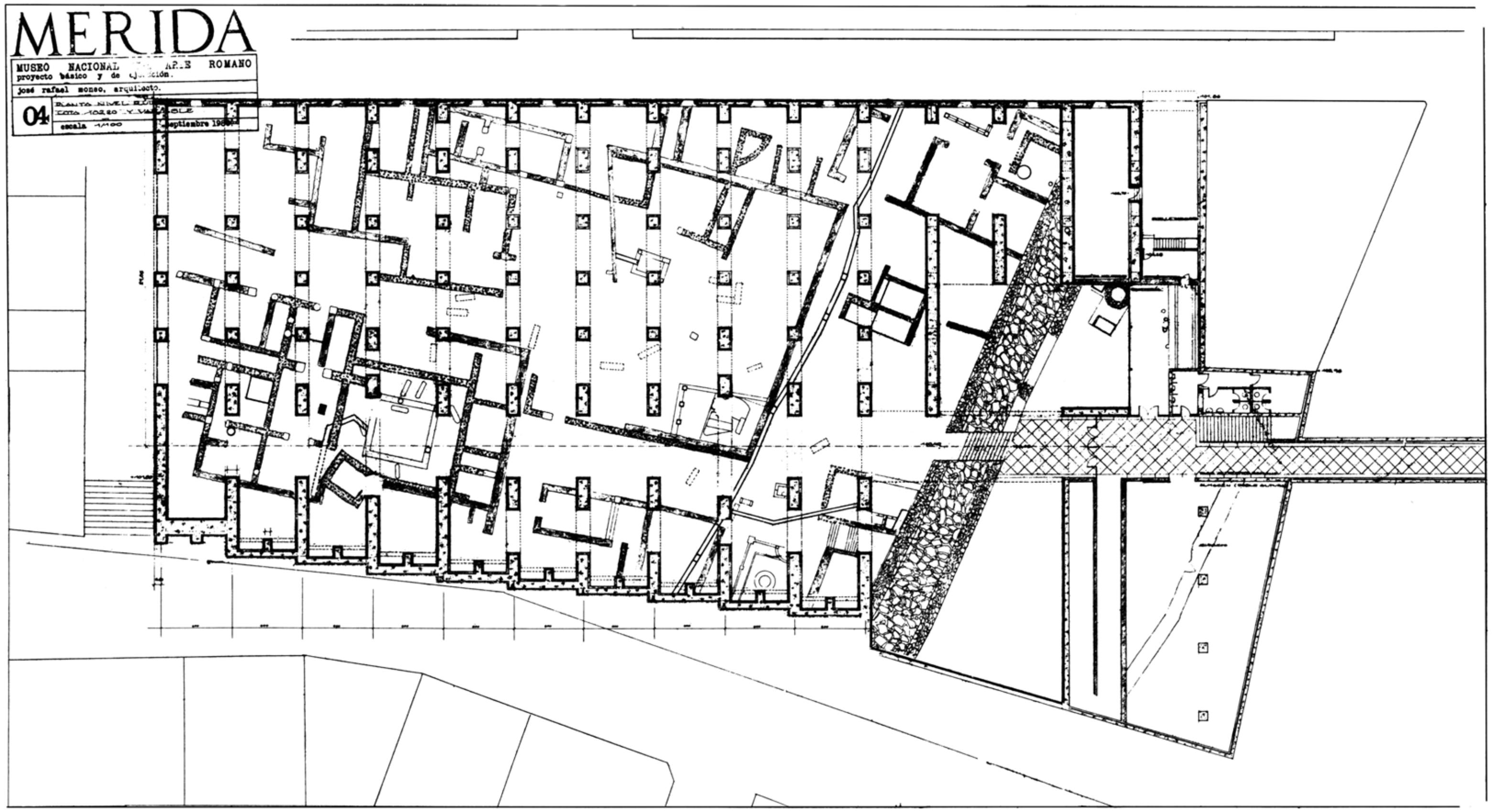
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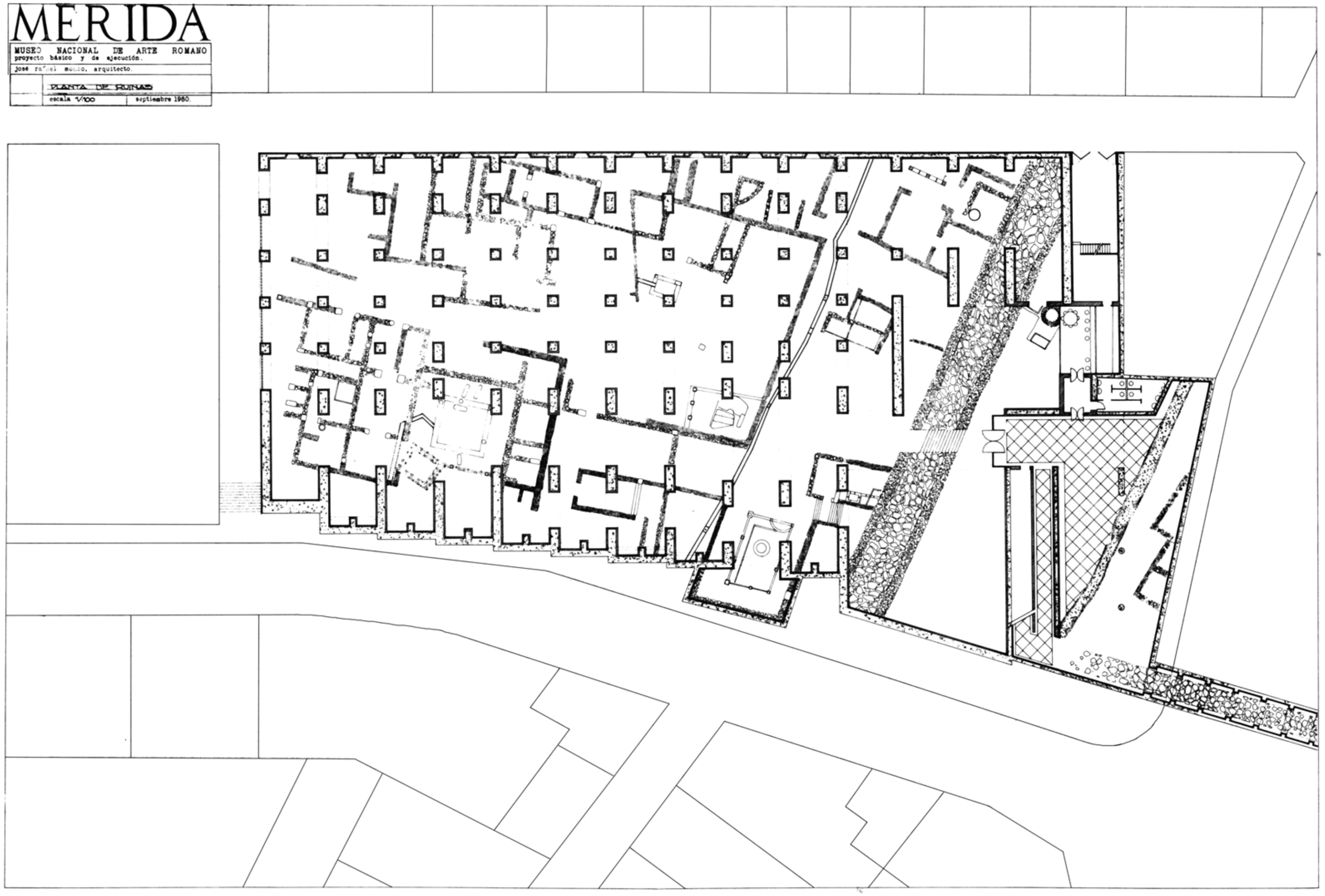
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
04
PLANTA NIVEL
COTA 10,20 Y VARIABLE
escala 1/100
septiembre 198


MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
PLANTA DE RUINAS
escala 1/100
septiembre 1980.

idea, but the main gallery for the museum is yet to be defined. What is becoming clear, Moneo notes, is the idea for a sequence of larger rectangular rooms instead of a single continuous gallery. Also clear in these sketches is that the sections and plans, even at this early stage of design, are beginning to deal with the issues of light, and the nature of the procedures that will be used in the construction of the building.

As the conception for the design became consolidated, a number of issues became clear. The drawing in figure 122 begins to suggest how the narrow galleries and the longitudinal main gallery will be joined. The sketches also suggest a courtyard and an embryonic idea for access to the museum galleries. In addition, the drawing emphasizes how important the underground level, and indeed the differences of level between the two streets, were from the very start of the design.

In the next sketches (figure 123), updated from the earliest sketches above, we see a section that is an almost definitive representation of the final design. Also pictured in these sketches are two courtyards, the buttresses, a tiny sketch of the facade, and indications about the dimensions for the museum, among other things. More critically, for Moneo, these sketches set out the difficulties of what would become a crucial issue for the design, namely the obliqueness of the street. Eventually the design would deal with the issue by using the buttresses sketched here to adapt the building's mass to the street.

After the critical conceptions were worked out, the office did a number of sketches to examine various issues. For example, a plan was drawn to reflect the accidents created by the overlap of the walls of the museum with the existing ruins (figure 124). This plan, when compared with the final plans drawn for the same level (figure 125), allows one to see the significant changes made in the corridor connecting with the theater and the amphitheater because of the peristyle that appears in the wall beneath the street.

Plans were drawn after the building was constructed to best understand the sense of the different horizontal levels of the design (figures 126–129). As Moneo states, **They were drawn as a direct, realistic reproduction of the different materials so I could depict an almost plain portrait of what would be seen after the section.** Because he wanted as plain a depiction as possible, he used few conventions of architectural drawing—the exception being the use of dotted lines to suggest overlapping plans. The drawings were made in order to provide a true image of the building's design.

The section in figure 130 is a seminal drawing for the project. It represents what Moneo calls "the brick fabric" as well as all the details necessary to build it. One could argue, he posits, that **the project was born from this drawing. It clearly shows the importance of the main gallery axis and makes manifest why an arch wasn't needed under the larger arch.** While seminal, the section is not definitive. Changes in the rear facade resulted in a much more complex construction in order to provide more light from the street. The upper platform depicted in this drawing was transformed—it lost its symmetry—as was the top of the room beneath the main street. This became a roofed chamber rather than the room topped by a slab as depicted in the drawing.

After the design was complete, Moneo attempted to produce a number of drawings that would describe what he calls "the complete reality of the building." The first axonometric (figure 131) explores the possibility of defining, with a single drawing, all the building's complexity: **Plan, section, roof, etc. are reflected in the drawing, which also shows all the intricacies of construction.** Whether successful or not, the fantasy of achieving a unique drawing able to convey all the information needed to build a building is what, for Moneo, permeates this drawing.

The next axonometric (figure 132) also attempts to be exhaustive in its description of the building. If the previous axonometric is toward the ground, figure 132 looks toward the ceiling. As a result, a number of details used to capture the light are clearly illustrated; e.g., the north corridor, the roof skylight, the south corridors (plus the barrier light walls), and the traplike slots in the sidewalk. This drawing, for Moneo, allows one to see clearly how the tall walls are borne by the underground chain of arches as well as how the concrete slab favors the exhibition of the mosaics.

Finally, the axonometric in figure 133 examines how the longitudinal facade that spans all along the street will be perceived. As noted earlier, the series of buttresses was used as an architectural device for solving the tensions between the oblique nature of the street and the internal system of rooms in the museum. The precision of the drawing also allows one to explore the issues involved with the brick construction.

In the end, both the issues of representation and the problems of crafting a building need to be addressed by the drawing to produce an architecture that best defines Moneo's commitments.

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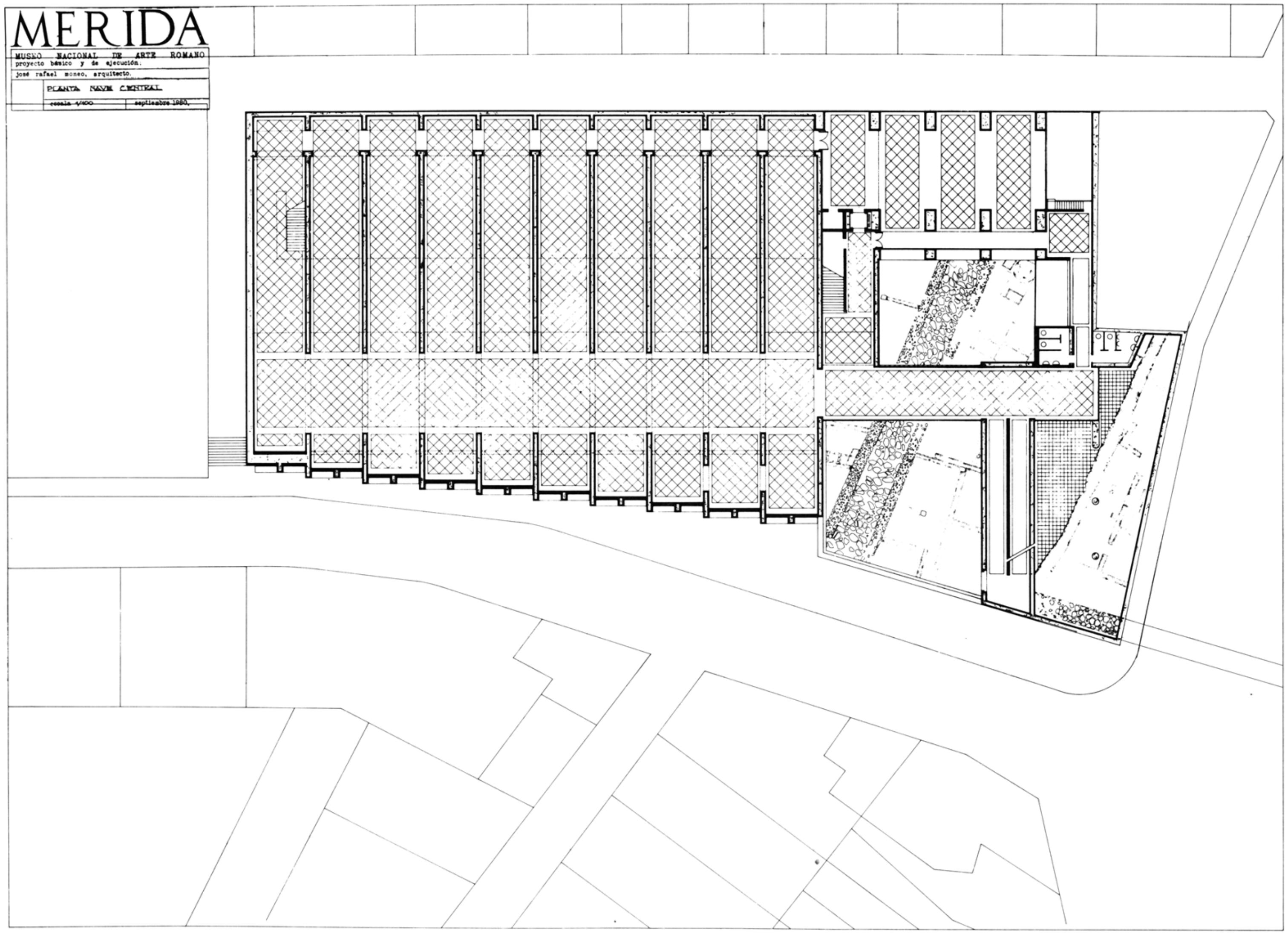
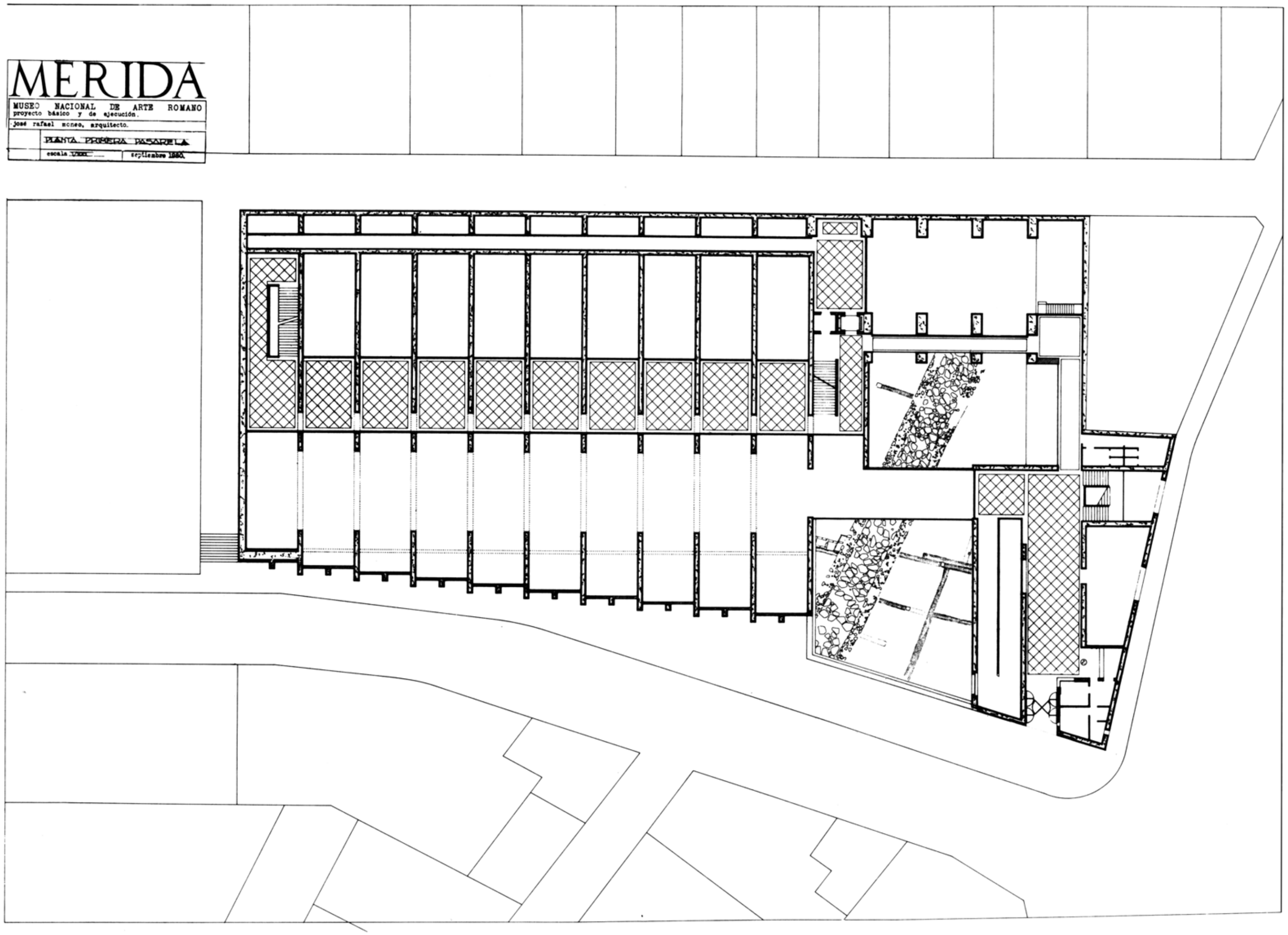
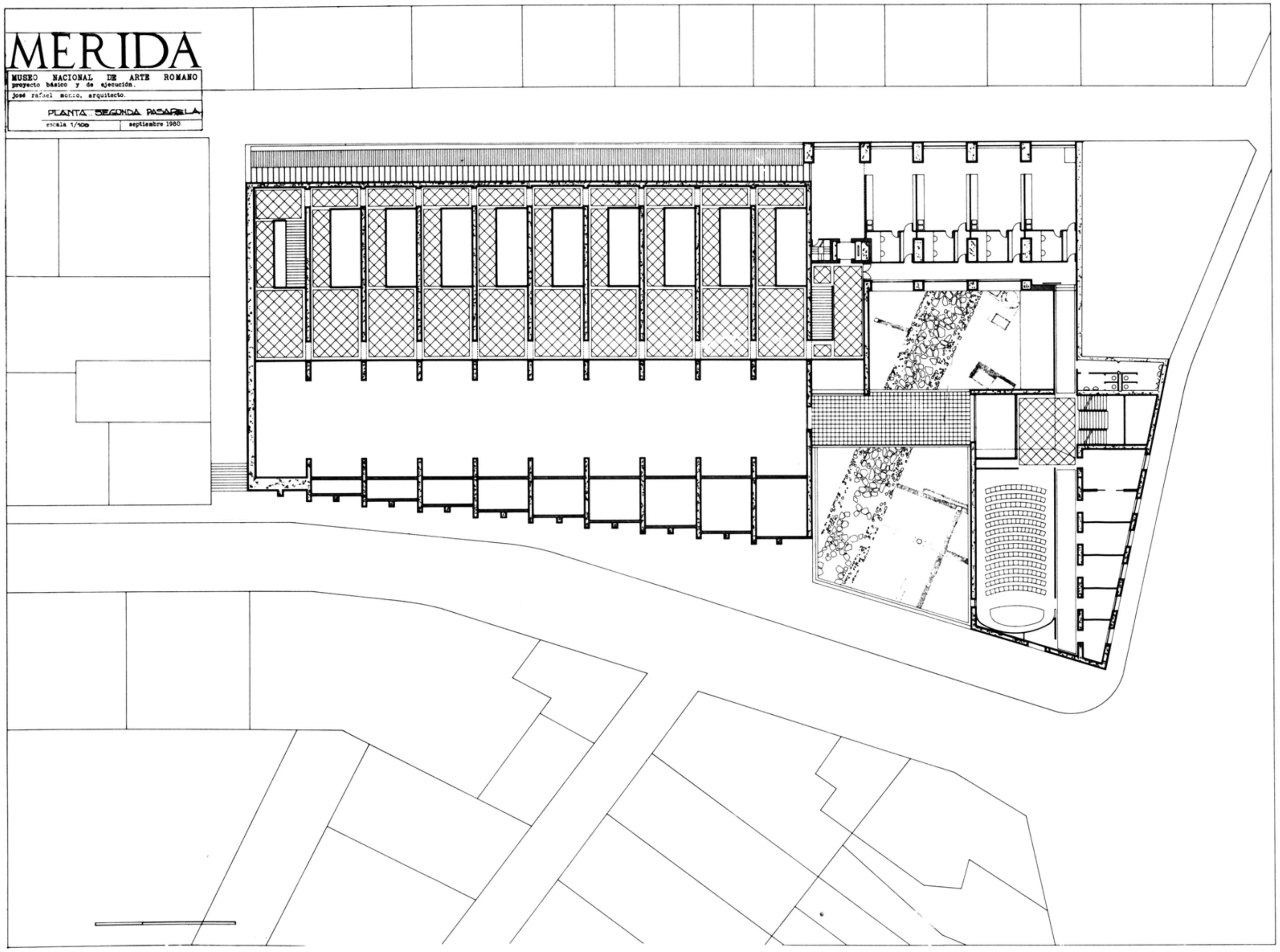
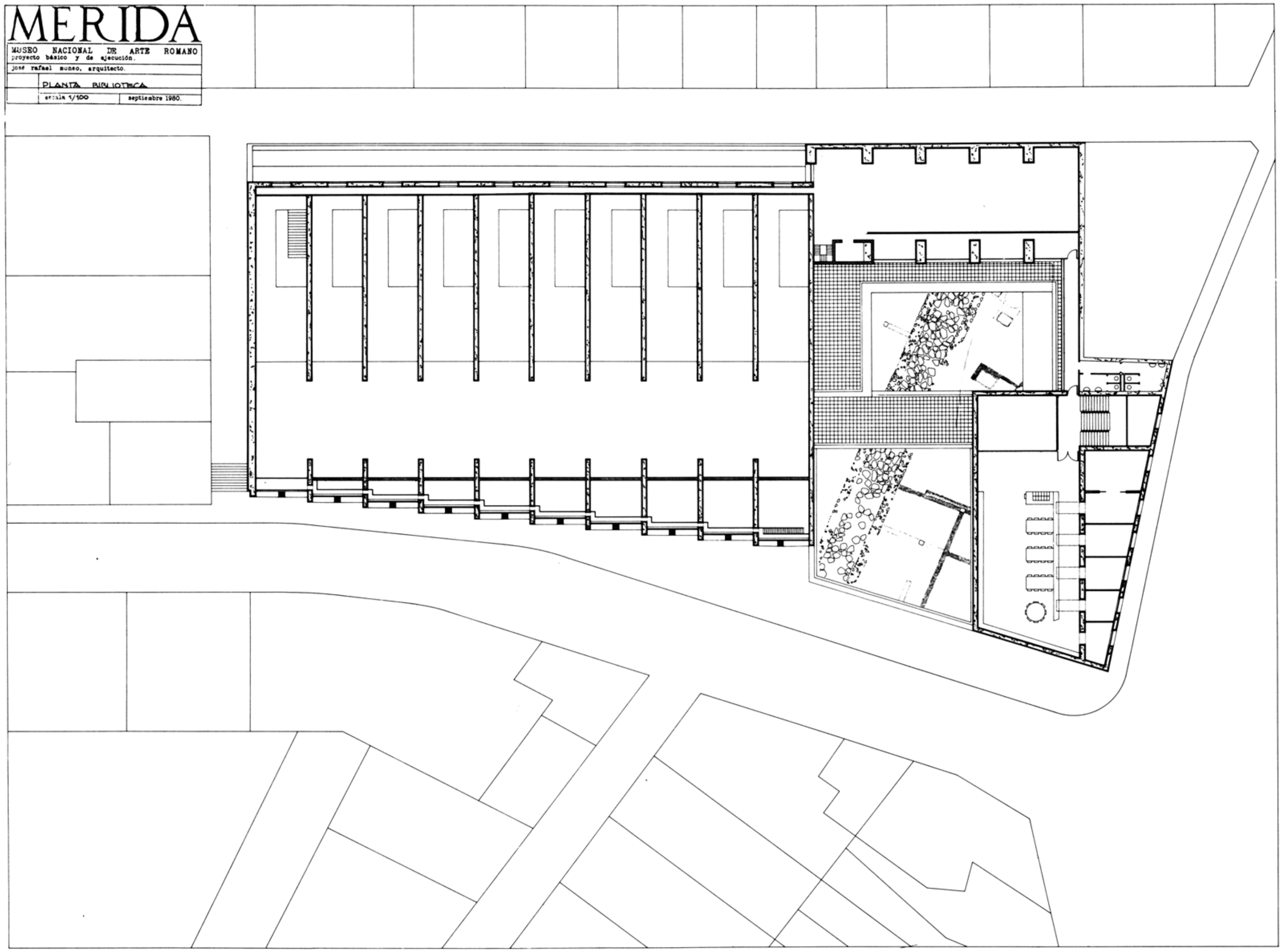

MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
PLANTA NAVE CENTRAL
escala 1/400
septiembre 1980.


MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
PLANTA PRIMERA PASARELA
escala
septiembre 1980.

264


MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
PLANTA. SEGUNDA PASARELA.
escala 1/100
septiembre 1980.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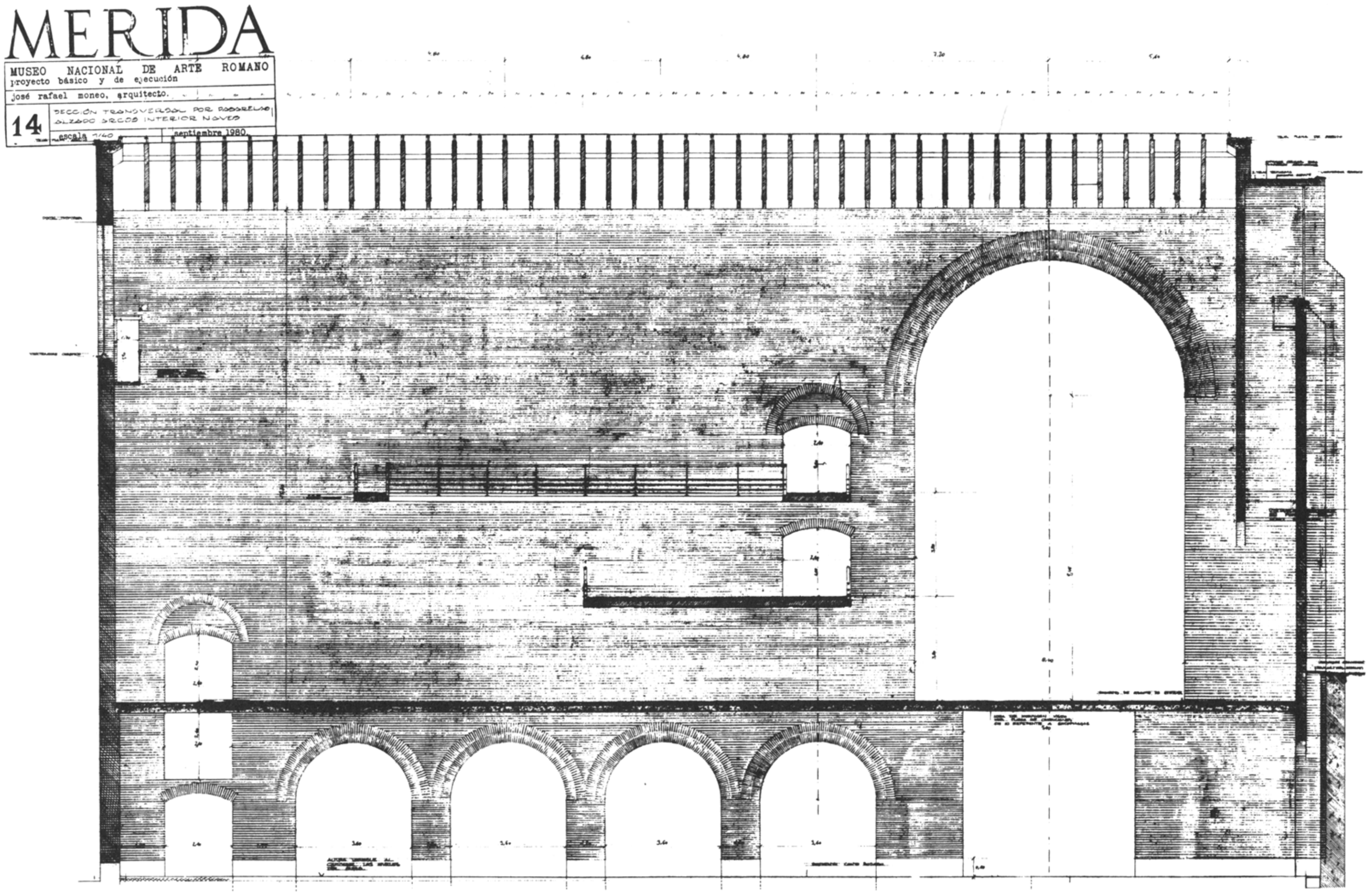
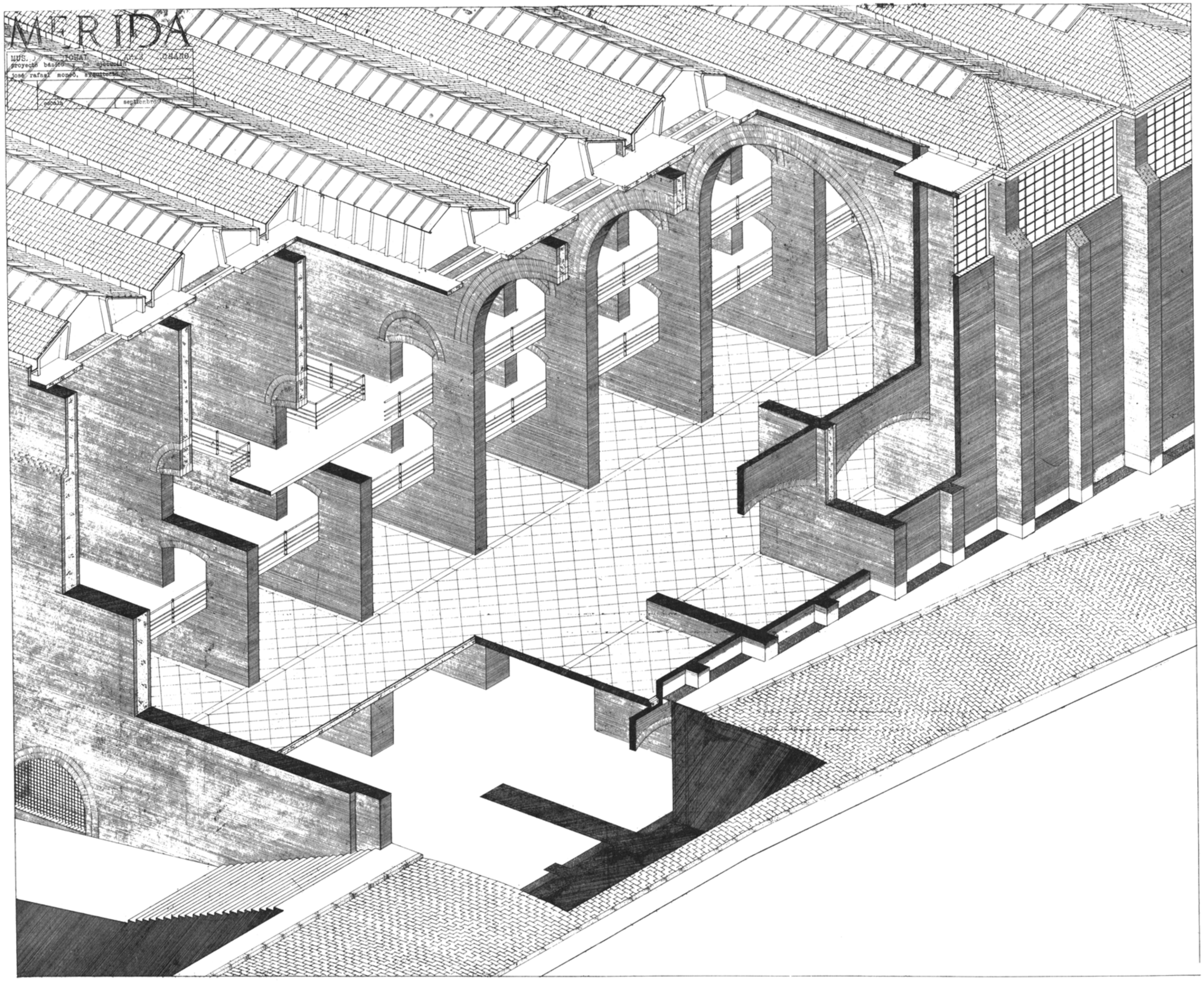
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
PLANTA BIBLIOTECA
escala 1/100
septiembre 1980.

266


MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución
josé rafael moneo, arquitecto.
14
SECCIÓN TRANSVERSAL POR PASARELAS
ALZADO ARCOS INTERIOR NAVES
escala 1/40
septiembre 1980.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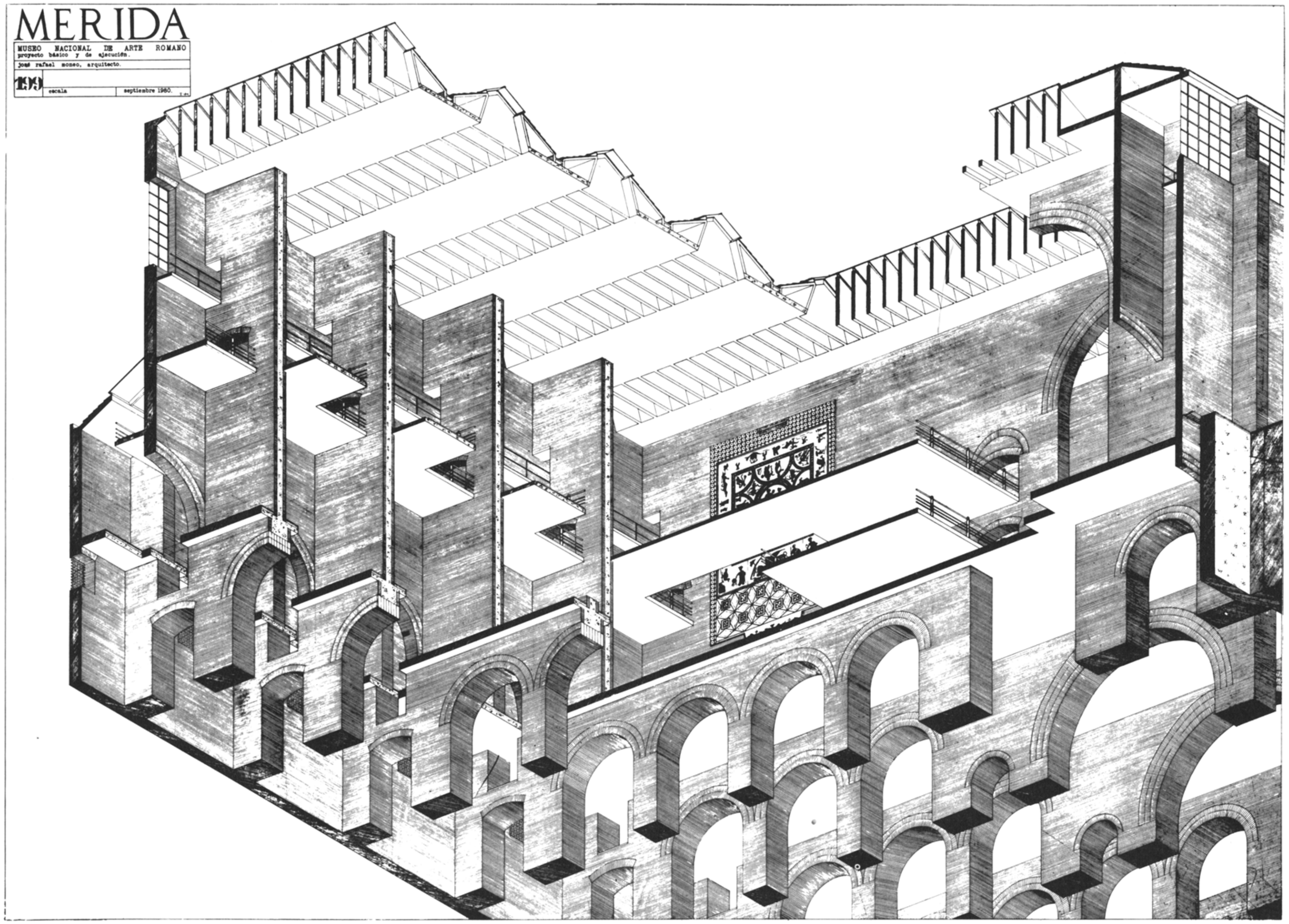
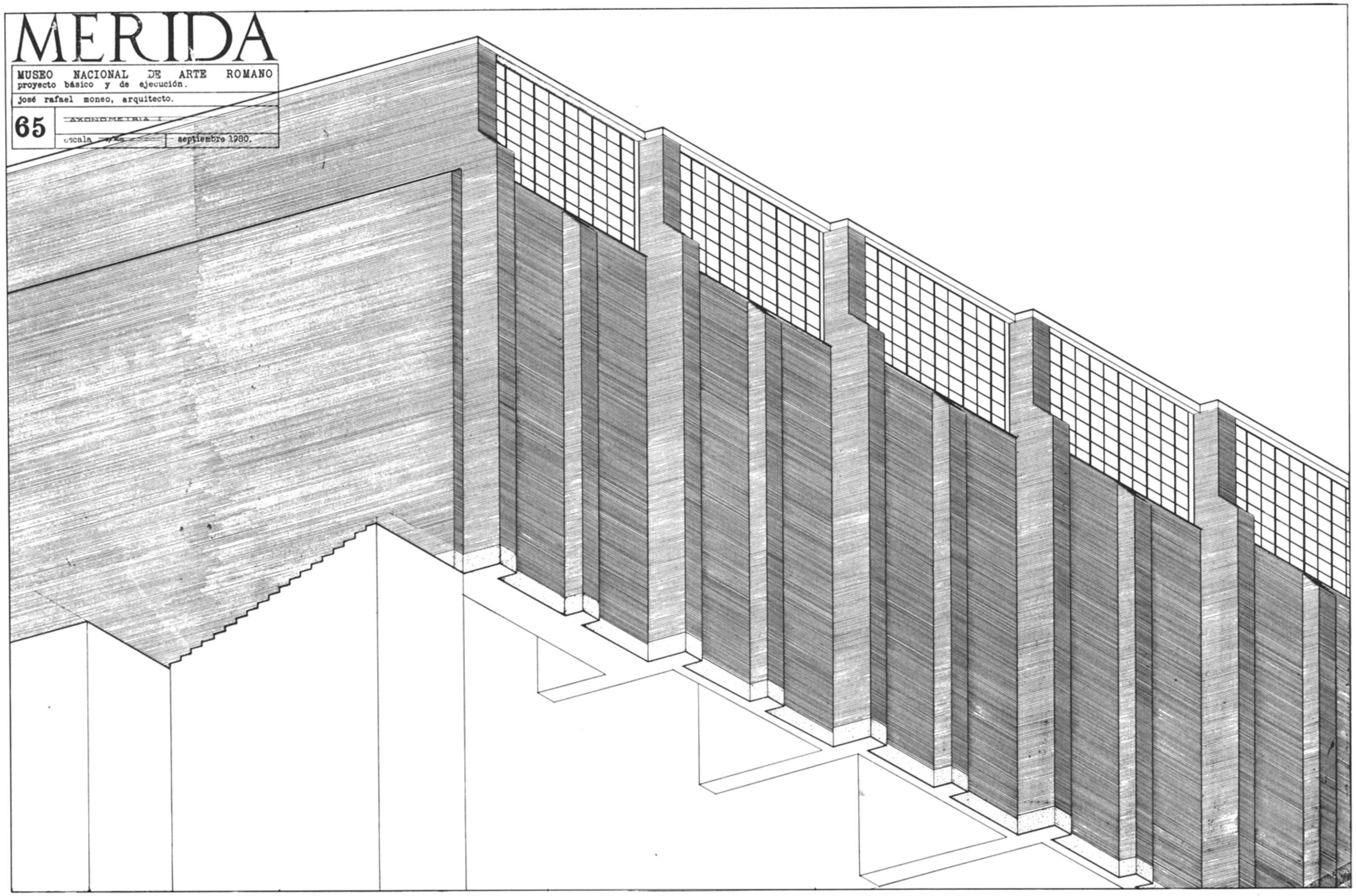
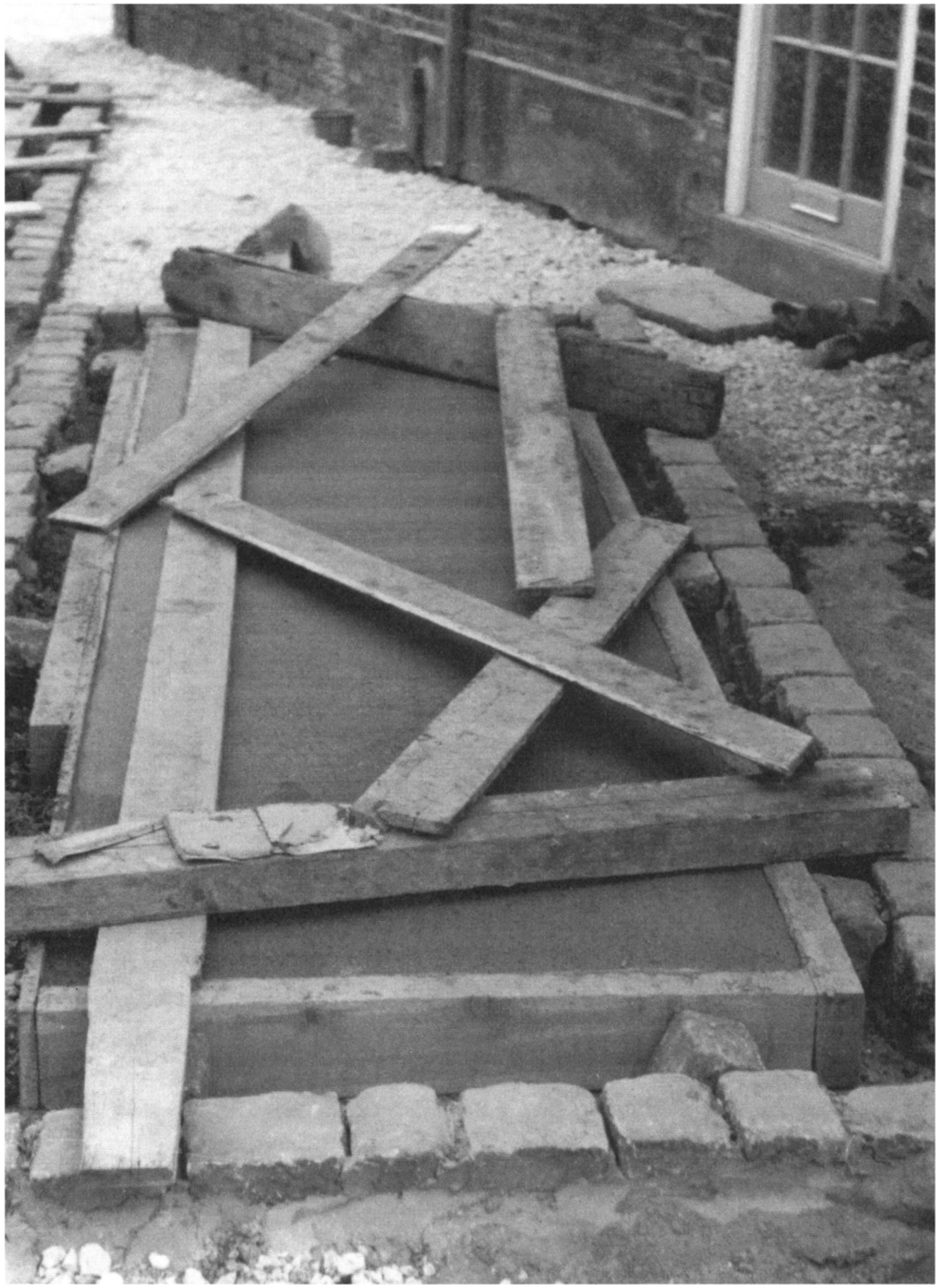
proyecto básico y de ejecución
josé rafael moneo, arquitecto
escala
septiembre

268


MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
199
escala
septiembre 1980.


MERIDA
MUSEO NACIONAL DE ARTE ROMANO
proyecto básico y de ejecución.
josé rafael moneo, arquitecto.
65
AXONOMETRIA I
escala
septiembre 1980.

133



Rod Hackney *Rod Hackney Architect*

Rod Hackney, former president of the RIBA and an advisor to Prince Charles, runs an architect-developer office that works with lower-income community groups and designs, develops, and builds market-based housing. Given the nature of the work of this office, there is less general emphasis on drawing in all the phases of design and more individual choice about when and how to draw: **There are quite a few traditionalists in our office who rely quite heavily on drawing and there are quite a few people who will use drawings simply as a method of communication. And then we have many types of client and we are our own client because we develop and build ourselves. We are not too fussy about the drawings we get because the man who builds the building is in our employment. Where clients require traditional drawings we can provide them.** When drawing, the office tends to use solid paper rather than tracing paper so that they can take advantage of the efficiencies of photocopying. For example, when a bay for a house or house type is designed and drawn, usually it will be photocopied and put into the design where it reappears.

Most drawing in the office, Hackney points out, is done after the fact. In actual practice, the office often relies on the skill of the craftsperson to build without the drawing at hand: **We do a lot of drawings after the fact. We tell the bricklayers that they should exercise their skill and we will draw what they have built. We draw this particularly for magazines because all our work gets published. So we have a team drawing up after all the building is done, measuring the building, drawing it, but we tend to evolve a building using the skills of joiners, bricklayers, roofer, etc., and see what comes out.** Drawing, for Hackney's office, is for the most part a means of communication and recordkeeping. Most of the drawing is done either for clients where requested, for magazines, or for the planning boards that must approve the building. Even those drawings meant for the planning authority more and more are done in freehand in order to save time. This often surprises the planners because they think such drawings lack precision. Hackney argues that such reactions are the result of the planners' traditional training.

In general the office resists hard-edge drawings in favor of freehand at all levels of design. Nonetheless, the office will do hard-edge drawings where necessary: **We do hard-edge drawings but usually we do a drawing when, let us say, the bricklayer needs it. We insist that our architects, a lot of people, live and work on site so that they actually do the drawing within the building if it is a rehab or on the site if it is a new building. So they actually pick up the rhythms of the site and the work. So the drawing is actually secondary to what we want to do. We want to build the building and we need to communicate to whoever is building—our in-house team. So our drawings can be very relaxed. We tend to do vernacular building so we don't need to be drawing a lot.** While the style of work of the office results in far less drawing than the more typical office, there are areas where drawings are made necessary by law and custom. But even here, Hackney notes, the office tries to do rather less drawing than more in order to keep the design team's options open: **We tend not to commit ourselves with our drawings. We will not overdesign in order to leave ourselves free to say "that is what we want to do" when we are on site. Because once you get approval stamped on a drawing you have got to build it. So for us the least information necessary is put into the drawing.** Even though his office draws rather less than other offices, they do one type of drawing that is not typical of other designers. Because the office sells its own buildings and property, they draw for title deeds. The title deed drawing serves as a legal documentation and serves as land deed as well, showing the position of the property, the property lines, the house location, the drains, all of which are measured very precisely.

Because Hackney is a developer, his office begins each project not with a conceptual drawing but with a series of programmatic researches into real estate values, technical problems that might be encountered, and the like. After getting this information, the office gets planning permission. Only then does it start to design the housing site. This might or might not lead to the use of drawing. This decision depends on the individual in charge of the project and on whether drawing is used in the process of setting up the site and locating the houses on it. After the design is completed, an artful rendering usually is made of the project for the press.

Since the office does mostly traditional housing, most of what is to be done is already known. However: **We will improve on the last lot of housing we did. If we've built something somewhere we will change a wall, we'll improve the design of the secondhand brick or stone or change the windows or glazing. Having done this then we will do building "regs," drawings based on the house types and house type elevations from the site plan.** During this process of design, after setting up the plan of the site, deciding on the house type, and sending the plans off for permission, a series of technical drawings will be produced that deal with issues like footing, foundations, and drainage. As these drawings, mostly in freehand, are being done, a series of test will be made on the site to firm up and change the design as it is felt necessary.

If during the process of design a member of the firm sees a particularly interesting house, he might draw it freehand for use in the present project or later projects. If a new wall idea is offered, for example, it will usually be tried in a project that is just being completed to see how well it works.

Given that the office always has some individual on site, there is a lot of to-scale drawing on the site. When the office is ready to begin actual construction, **we do a layout**

drawing showing where to spray the soil with white or yellow paint. Usually the man who does the bulldozer work or someone else comes along with the map and sprays the whole site. The man who does that remeasures and sprays on where the concrete will go. We'll look at it and actually change a shape to correct a mistake. What the office is doing, Hackney points out, is making template drawings as the process of construction proceeds along. After the slab is poured (figure 134), it becomes a full-sized drawing board: **We spray where walls, fireplaces, doors, and such go. The whole site is sprayed and that tells the bricklayer what he is doing.** When the slab has been sprayed, the bricklayer looks at what has been done and informs the office how long it will take so that the office can price the work. Work by the bricklayers proceeds until they have reached about seven feet six inches. At this point, the architects again spray the walls to show where timber joists will go. After the joists are put in place by the joiner, the bricklayer returns to complete his work. When the project is to the eaves, the joiner comes back. It is at this stage that the designers decide what the final details of the roof will be and set them out for the joiner.

During this process and throughout the construction process, the office submits drawings to the council planners for approval, rather than providing the planners with a complete set of working drawings as is the usual practice. This strategy is defined by the process of on-site design that the office uses. **After the shell is completed, the designers go back, look at it, and say "this is what we thought we would do. There is a good view there, so maybe we should do this." Then we will spray out types of windows and doors. Then we go into the gardens—it is a turnkey operation—and spray out locations. The architects might well do the planting as it is just as quick as putting a stake where you want things. Then we will spray out the road with the drains and the garage. Then we will go back into the shell and rearrange things, tell the decorators what color to use by spraying the color on the wall. And that is the house. If we like it we'll do a really detailed drawing.** The detailed drawings are produced for potential clients, for newspaper advertisements, and as a record of the house in case someone in the future requests an image of it.

A particularly effective method, Hackney finds, for depicting his schemes is the bird's-eye view photomontage. These images act in a way like a freehand drawing because the photos can be cut up, rearranged, and used to define precisely the image one wants for a project. Such photomontages, though, are less a matter of actual research on a project than of presentation, particularly for advertising a project.

Drawing for Hackney is more an issue of necessity and contingency than of ideology. He argues that one must use the drawing that is necessary to the task being confronted and the group for which it is meant. So, for example, while his office does not usually do hard-edge drawings, there are groups for whom such drawings are a part of their working process so Hackney will do them: **Well, let us say we are working for a housing association and we've got a traditional job to do. While they [hard-edge drawings] don't help the building process at all, it is a tradition that they are used to and so we can't move until we have the architect's plan.** Axonometrics and perspectives will be produced for other particular contingencies, most often for advertising or if the office is entering a competition. Because such work is unnecessary to the office's mode of practice, Hackney finds himself entering fewer and fewer competitions.

Even working drawings are made only if they are needed by planning commissions. Within the practice such drawings are unnecessary because of the way the office goes about the design and building of its own projects. Where working drawings are necessary, Hackney believes there should be as little detail on them as possible. Because they are produced mostly for planning commissions (figures 135, 136), and given the way the office works on site, detail gets in the way of the capacity to change as the site and work demand it.

Drawings are used when dealing with clients, particularly when dealing with committees for use at their meetings: **We always try to get liaisons to work through the committees. We'll send a set of drawings to the client liaison, especially if the client is nervous about a certain aspect. We don't want to waste a lot of money so we send an outline sketch and ask "how is that for starters?" They'll write back and tell us. We also send drawings to clients who are technically able to help us, like let us say hospital administrators. It all depends on the capacity of the client. Drawings can be used to trigger off a settlement of a dispute or used when a design has reached a certain stage to ask for feedback, or there are times when you use a drawing to pacify the client.** When using drawings with clients, Hackney believes that any type can be used (figure 137), depending on the problem or reason the client needs the drawing. Sometimes he will send a drawing and explain what its status is in the design process to show a client how expensive or difficult a change asked for by the client is. But in step with Hackney's general philosophy of keeping drawing to a minimum, "we won't send too many drawings to the client unless there is a reason."

While drawings are used to communicate to clients, they are not a major part of the mode of communication within the firm, even though a number of the architects in the firm draw for their own purposes. Sometimes Hackney himself might leave a little freehand sketch for someone in the office to experiment with and see what can be done with an idea, but on the whole "there is very little drawing communication within the firm." Some in the office do use

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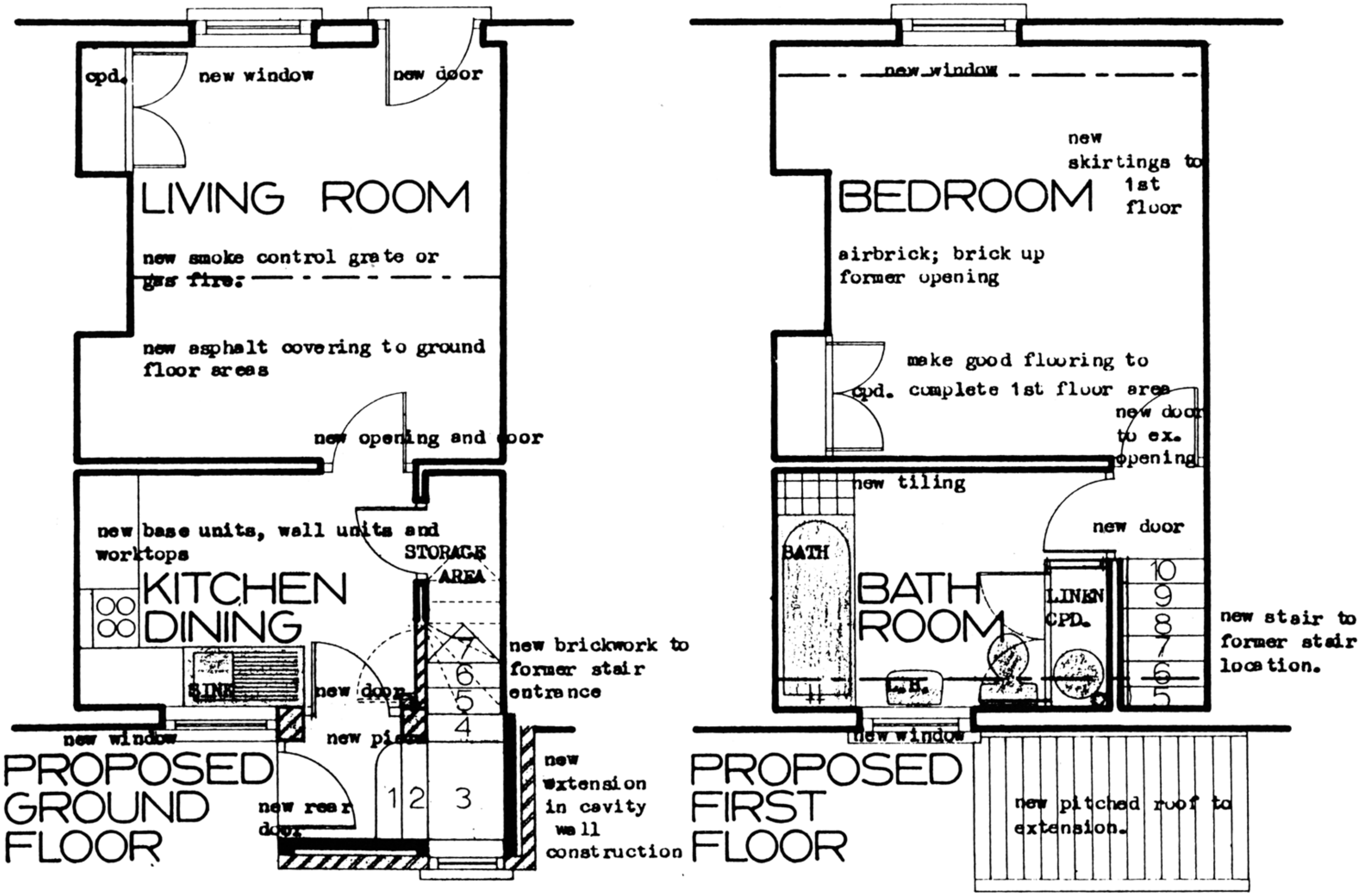
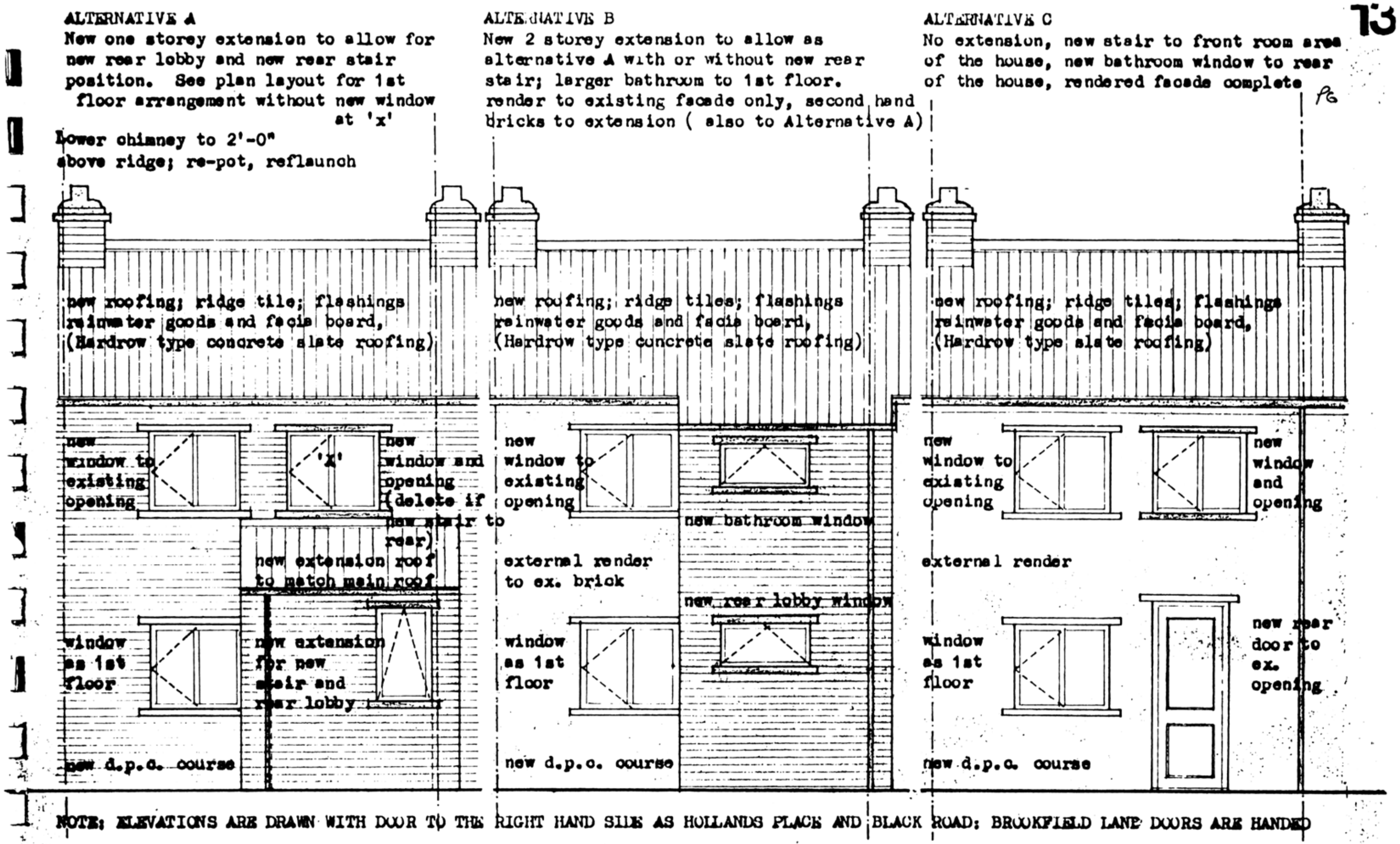
THIS PROPOSAL REPRESENTS THE BEST ARRANGEMENT FOR A CENTRAL TERRACE PROPERTY WITH A LARGE BATHROOM PROVIDED TO THE REAR FIRST FLOOR AREA, A NEW STAIR WITH A LOWER QUARTER LANDING HOUSED WITHIN A NEW EXTENSION, KITCHEN DINING AREA TO REAR GROUND FLOOR. PROPERTY SUITABLE FOR ONE OR TWO PERSON USE. STORAGE AVAIALABLE TO KITCHEN UNIT AREA, TO EAXH SIDE OF CHIMNEY BREAST TO LIVING ROOM AND BEDROOM AND LARGE AREA UNDER STAIRS OFF THE NEW KITCHEN. NEW MATCHING PITCH ROOF TO EXTENSION.

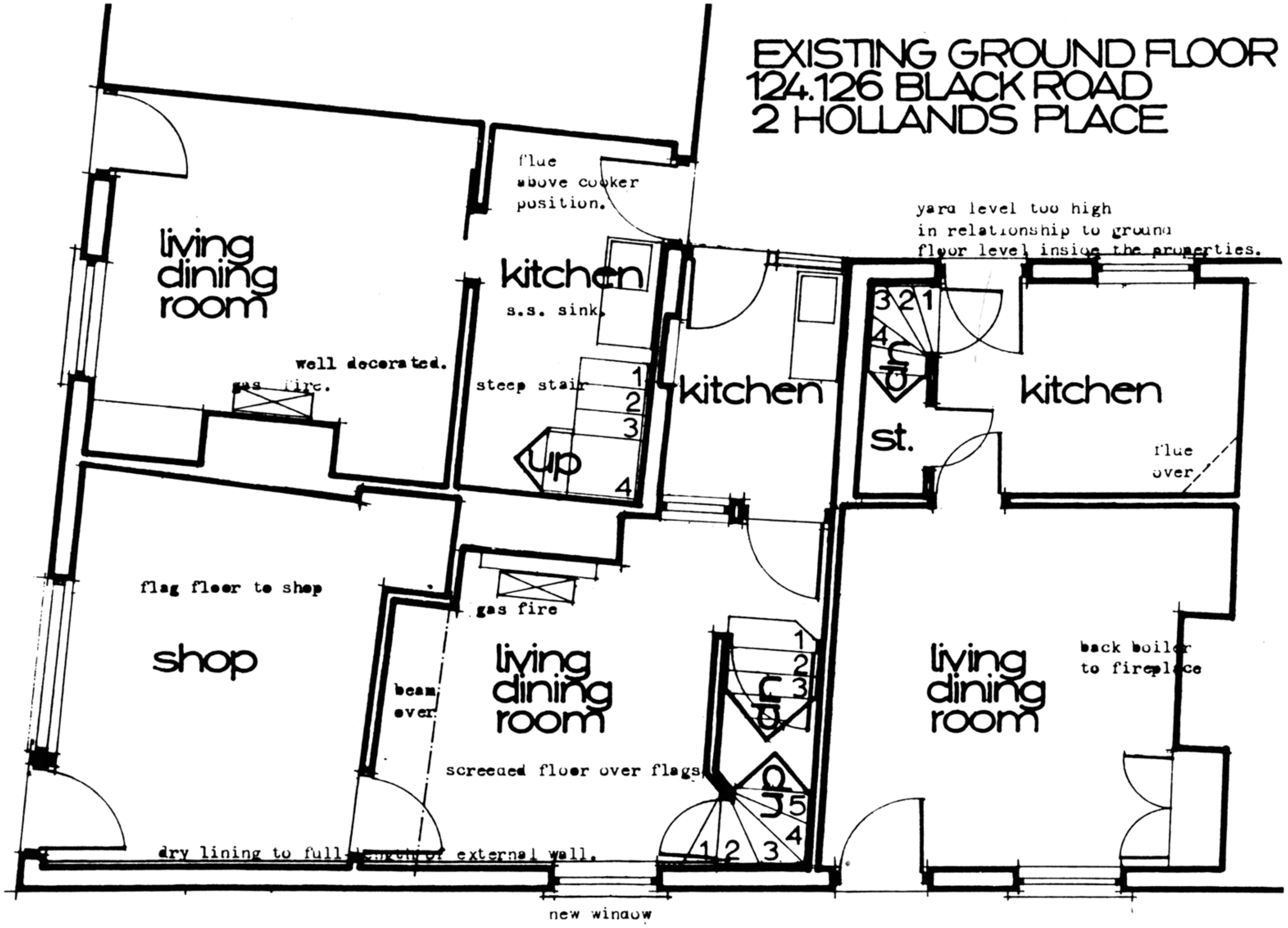

cpd.
new window
new door
LIVING ROOM
new smoke control grate or gas fire.
new asphalt covering to ground floor areas
new opening and door
new base units, wall units and worktops
STORAGE AREA
KITCHEN DINING
SINK
new door
new brickwork to former stair entrance
new window
new piers
7
6
5
4
1
2
3
new rear door
new extension in cavity wall construction
PROPOSED GROUND FLOOR
new window
new skirtings to 1st floor
BEDROOM
airbrick; brick up former opening
make good flooring to complete 1st floor area
cpd.
new door to ex. opening
new tiling
new door
BATH
BATH ROOM
LINEN CPD.
W.H.
10
9
8
7
6
5
new stair to former stair location.
new window
PROPOSED FIRST FLOOR
new pitched roof to extension.

13


ALTERNATIVE A
New one storey extension to allow for new rear lobby and new rear stair position. See plan layout for 1st floor arrangement without new window at 'x'
Lower chimney to 2'-0" above ridge; re-pot, reflaunch
ALTERNATIVE B
New 2 storey extension to allow as alternative A with or without new rear stair; larger bathroom to 1st floor. render to existing facade only, second hand bricks to extension (also to Alternative A)
ALTERNATIVE C
No extension, new stair to front room area of the house, new bathroom window to rear of the house, rendered facade complete
PG
new roofing; ridge tile; flashings rainwater goods and facia board, (Hardrow type concrete slate roofing)
new roofing; ridge tiles; flashings rainwater goods and facia board, (Hardrow type concrete slate roofing)
new roofing; ridge tiles; flashings rainwater goods and facia board, (Hardrow type slate roofing)
new window to existing opening
'X'
new window and opening (delete if new stair to rear)
new extension roof to match main roof
window as 1st floor
new extension for new stair and rear lobby
new d.p.c. course
new window to existing opening
new bathroom window
external render to ex. brick
new rear lobby window
window as 1st floor
new d.p.c. course
new window to existing opening
new window and opening
external render
new rear door to ex. opening
window as 1st floor
new d.p.c. course

NOTE: ELEVATIONS ARE DRAWN WITH DOOR TO THE RIGHT HAND SIDE AS HOLLANDS PLACE AND BLACK ROAD; BROOKFIELD LANE DOORS ARE HANDED

REAR ELEVATIONS ILLUSTRATING PROPOSED IMPROVEMENT TO CENTRAL TERRACE PROPERTIES TO BROOKFIELD LANE BLACK ROAD AND HOLLANDS PLACE. SCALE 1/4" TO 1'-0"


EXISTING GROUND FLOOR
124.126 BLACK ROAD
2 HOLLANDS PLACE
living dining room
well decorated.
gas fire.
kitchen
flue above cooker position.
s.s. sink.
steep stair
up
1
2
3
4
kitchen
yard level too high in relationship to ground floor level inside the properties.
3 2 1
4
st.
kitchen
flue over
shop
flag floor to shop
gas fire
beam over
living dining room
screeded floor over flags.
dry lining to full length of external wall.
1
2
3
4
5
new window
living dining room
back boiler to fireplace

137

drawings for their own testing of ideas and for their own recordkeeping, but this is not usual since most of the members of the firm work on the site itself.

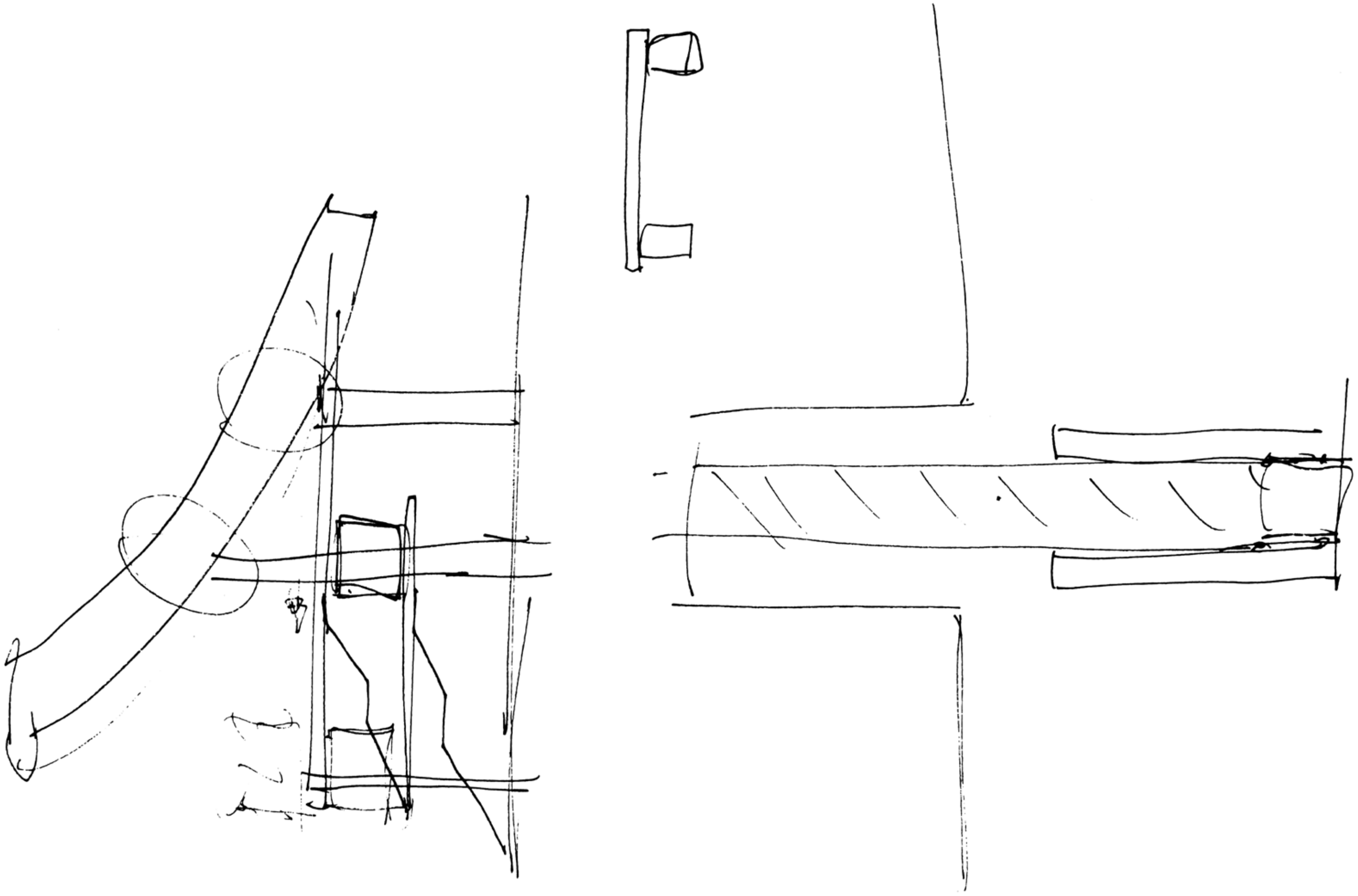
Special attention is paid to drawings that go out for public consumption, whether for a competition, the press, any other public medium like television, or for public exhibition. Usually the drawings are done especially for the particular presentation and are made in color and simplified so that people will be able to understand them.

At times, too, in the rare instance (given that most of Hackney's housing designs are simple and traditional) that the office designs a complicated structure requiring special engineering design, the office will work very closely with an engineer before actually making a technical drawing. In this instance, some communication is done through drawing. Also, when the firm uses builders who are not under their umbrella, they will use traditional working drawings to guide construction.

What Hackney has found, he points out, is that it is far more efficient to work with the craftspersons on site than to have them use drawings or draw out specifications themselves. Moreover, he argues that drawing too much technical detail robs craftspersons of their skill and can often lead to badly realized design: **Architects spend a lot of time trying to work out brick details, but it depends on the man mixing—how many bricks he will use, how wide his joints will be. If a fellow's trying to work to your height and finds himself a half a course low, does he go higher or lower or does he cut the brick in half? Sometimes in trying to comply with the drawing it turns out terrible. Drawing is just part of the process. It should be a helping aid rather than dictatorial.** That is why Hackney prefers to work on site: he argues that if he didn't, he would have to rely on drawing. But, he realizes, the lack of drawing in the office and some of the skills necessary to draw technically does limit the kind of practice he can have. He can't design monumental buildings or one-of-a-kind buildings because that would entail more drawing and drawing skills than he feels his practice can afford. It would also mean a different character of design than he is interested in: **We're a bit cavalier. But we want a rustic building because it sells. And the community clients we work with are simply not interested in drawings at all.** Drawing can also become a burden for Hackney's projects, especially when dealing with his self-build clients. Because they see drawings as expensive and unnecessary, they resist them. While dealing with all clients for Hackney involves both verbal negotiation and actually building a few houses plus drawing, the self-build clients **are the most fussy of all. They don't want drawings to stop them. We build a slab and they take it from there.** As a result, in self-build community projects there is often a problem with the planning authorities, as this approach often means a constant amending of the drawings done for the authority and a process of bringing the authority to the site to see what is going on rather than relying on drawings alone. What drawing is done for self-build projects is for recording purposes for the office as well as the planning authority. The self-builders themselves are for the most part, according to Hackney, uninterested in such drawings.

Drawings, though, are important for Hackney's office when, as is often the case, they use secondhand materials that they take down themselves. There it is important to measure and draw each piece of the element that is being removed. In this process each piece is drawn to measure, photographed, and numbered for the craftsperson who will put it together and place it in its new location. It is in this area of their work that Hackney feels they must be most precise and detailed in their drawing, because once something is removed from its original place without a detailed drawing it is hard to use correctly again.

It is not that Hackney doesn't appreciate architectural drawing. When he was president of the RIBA, his office was studded with architectural drawings that he had placed there: "I like drawings, my desk is surrounded by them." In contrast to most architects, though, he does not use drawing to test ideas, because he does very little experimentation in his work. Working on site, he finds drawing unnecessary and too time-consuming for it to be appropriate to his method of design. In the end, Hackney's practice replaces drawing with on-site work and the architect's pen with the craftsperson's verbal and hands-on approach. As such, his mode of practice harks back to an older and more tradition-bound approach to architecture and a narrower, but not necessarily less creative, idea of the architect's role than is normally taken by architects and critics of architecture.



Peter Rice *Ove Arup & Partners*

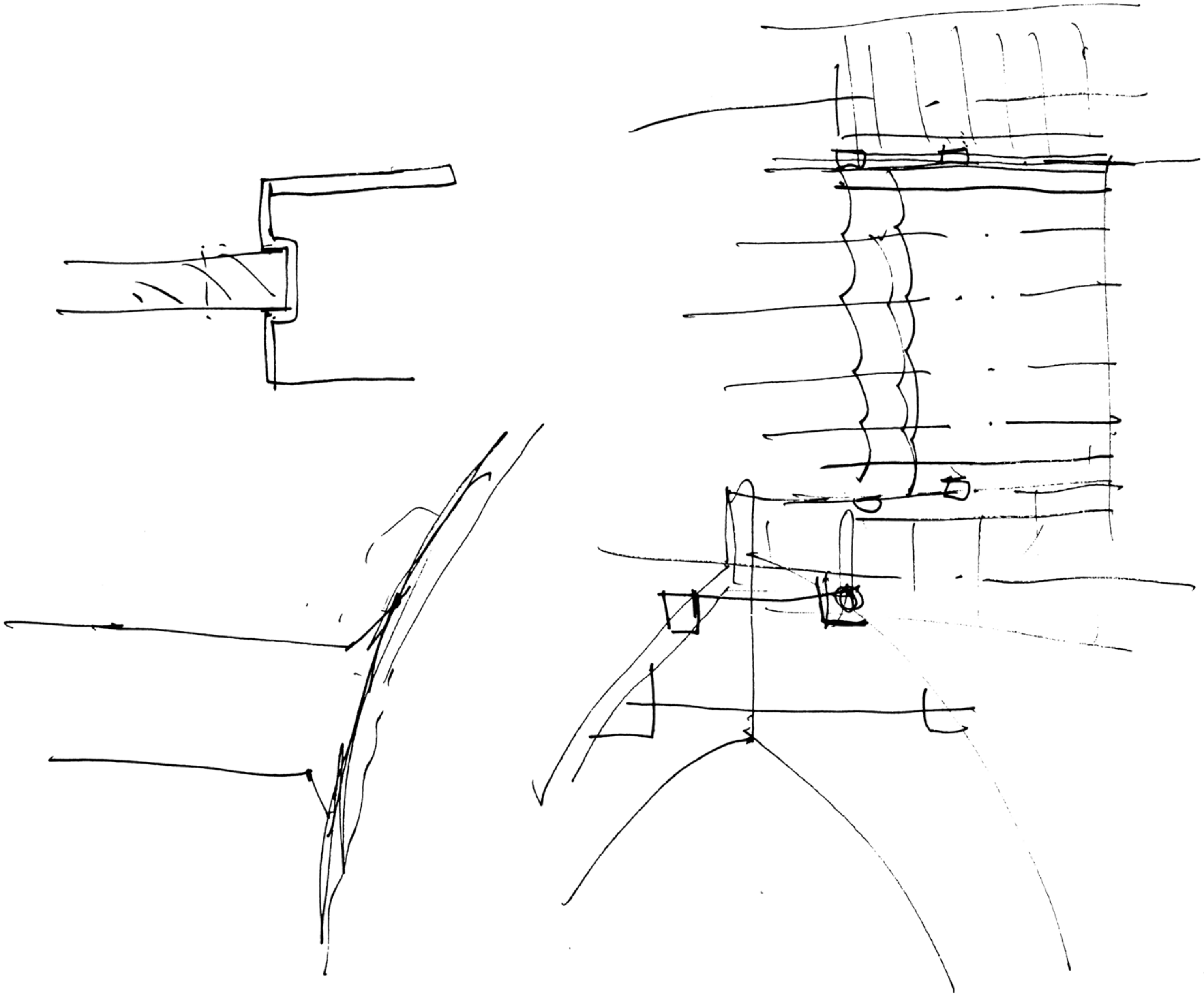
Peter Rice, a structural engineer and senior partner with the Ove Arup firm, worked with many architects, among whom are Richard Rogers, Renzo Piano, and Bernard Tschumi, on such projects as Lloyd's Bank, the Pompidou Center, the DeMenil Museum, and the park of La Villette in Paris. From such associations, Rice developed a unique and important view of the role of drawing in architecture. Asked the same questions as the architects interviewed for this book, he adds another dimension to the discussion of drawing in architecture.[8]

Drawing, for Rice, is a key factor in his relationship with architects. How architects draw and the way they use their drawings at the conceptual level, however, are less interesting to him than the drawings that are used after the conceptual stage of a project. This is because he looks on architecture, as he says, in terms of its mechanisms.

Nonetheless, Rice feels that the quality of architectural drawing given to engineers and builders is very important. It is the drawing that is often the instrument that provokes such people to respond to architectural ideas: **The way in which drawings are used by architects after the conceptual stage and the quality of these drawings does an awful lot to persuade even builders, people in the industry, to take ideas that they may not understand seriously.**

A lot of what I do is individual at a certain level. I am an engineer who does a sort of design that becomes an architectural feature, and part of that process is to look at individual structural ideas, the individual detailing and the structural pieces. I find that it is very important that kind of work be drawn very clearly. In relation to the other professions in the industry and particularly if you want to work with builders, building craftsmen, people who can put some of their own craft into the object, they become more interested when they see something that is well drawn. I guess it is a sign of respect. Rice sketches at times, as we see in his work for the stadium at San Nicola in Bari, Italy (figures 138 and 139), and for the Pavilion of the Future at Expo '92 in Seville, Spain (figure 140). His principal method of working, however, is to construct things in his mind. The process by which what he develops in his mind is materialized as a design is very gradual. Before he can present a design to the architects, Rice feels that he has to communicate with the architects in a way that educates them. This education, so to speak, allows them to understand the purposes, advantages, and characteristics of a solution or element that he will suggest.

One of the reasons Rice doesn't draw a great deal is that he feels there are aspects of engineering, often little understood by architects, that are critical to the way buildings work but are not reducible to an image: **There is a fundamental element that I find is very little understood by architects, and that is the impact of one's physical**



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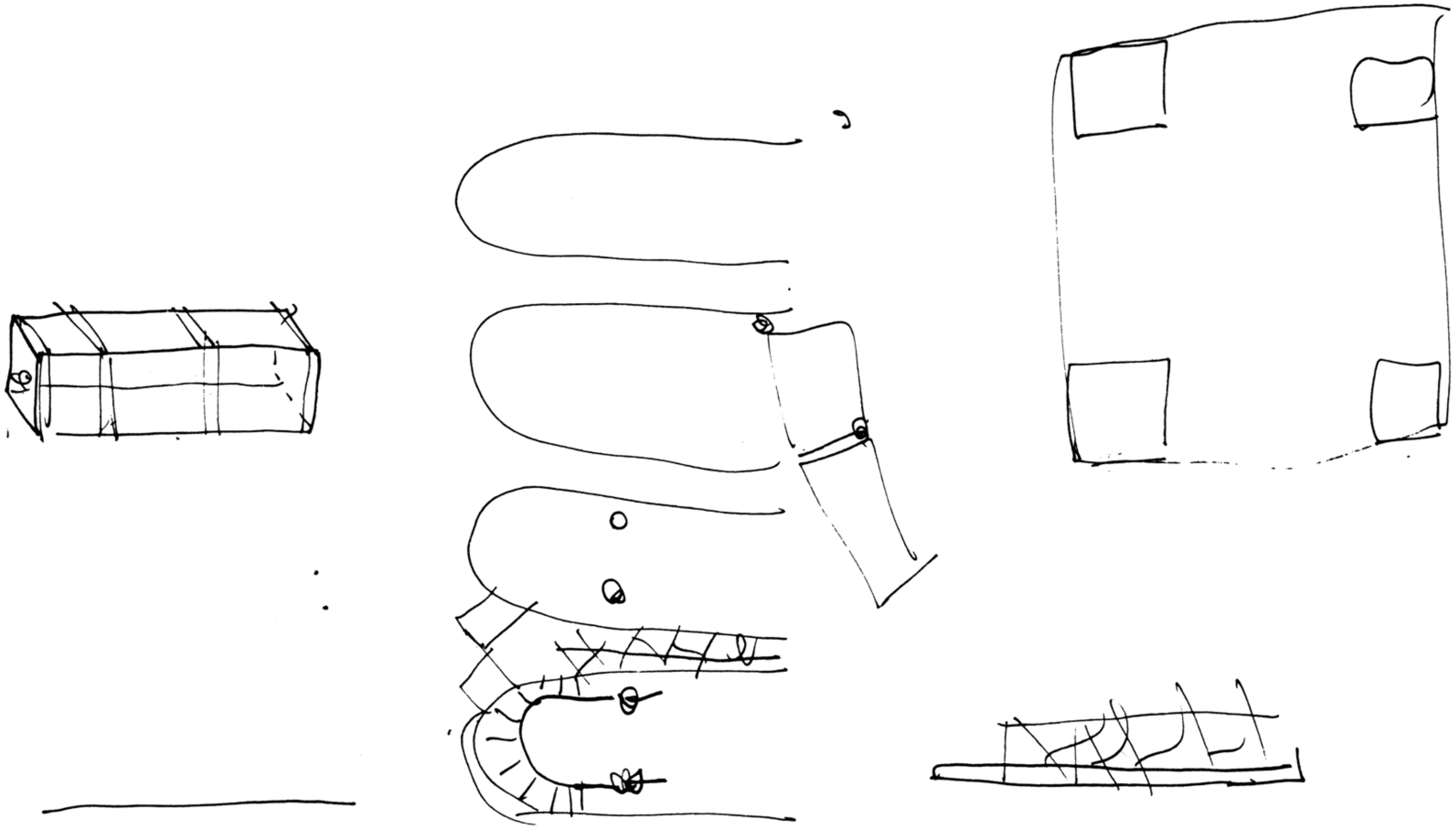

understanding of the way things work. . . . We have built into our perception a natural understanding of what is right and what is not right; what a correct structural image is. If you look at a bridge, you can feel a certain structural coherence, and that is something built into you, an understanding of things.

When you get outside that, when you change one of the parameters—if you make a bridge where the slab is not the size you naturally expect—that has an immediately destabilizing effect on the way you perceive something. That is the relationship between what you design and natural perception that is a fundamental ingredient I work with. Architects are rarely aware of these relationships, Rice posits, because they have a strong tendency to think only in visual terms. In effect, drawing works, at times, to limit design because it prohibits architects from **entering a realm which enables you to create effects which are quite different from the proportions as seen in a drawing. One is often playing with elements which have a dimension other than how they might look in a drawing.**

They [architects] use structure in the same way that they use other elements. That is, as part of a visual assembly. There are certain architects, for example, who are looking to make things lighter in order to make the visual impact of things lighter. But there is a point beyond which if you try to make things light you destabilize people's ability to understand what is going on. Rice points to the design of the Pompidou Center with its external elevator as an example. The elevator is hung from above, so it appears to be unstable. At one point in the design process, some of the architects on the project, although not all, wanted to hang the elevator with the lightest materials possible. Rice resisted. Eventually very heavy steel was used to give people a sense of stability.

When architects are using structure as a part of an architectural assembly, Rice argues, it is not so much that they are insensitive to the way people experience structure. Rather, in thinking visually, architects become involved in the visual organization and proportion of a building and not its materiality and making. This emphasis on the visual prevents architects from an awareness that as you move outside the normal framework of perception you immediately create another effect. To meet your visual objective, you need to base it on the material and structural nature of the building. You cannot achieve the effect you want by basing it on a visual representation alone: **I think that at times architects and designers are in some respects too detached from the process of building, and the drawing methods they use are very much an element of this detachment.** Because Rice feels that the nature of a building's reception is profoundly influenced by its structure and engineering, he refuses merely to act as a cog in the architect's wheel. Rather he sees his work as a parallel to that of the architect but in a narrower sphere of action. Rice uses an analogy from music offered by a French architect whom Rice has worked with. What this architect said in effect was that the architect is composer and the engineer an inspiration. Rice goes on to say that he himself **designs primarily or almost entirely that part of the building that is engineered, whereas the architect uses engineering as a part of the total architectural image of the building or what he, the architect, sees as designing.** His interest, Rice adds, is what moves him to understand the nature of structural perception of a building. And this interest leads him to the conclusion that drawing, while an essential part of the design process for architects, misses a large part of what a building is about and how it is received by people: **To feel right in a building is a primary requirement for people at a certain level. Their perception of this has a lot to do with the lines of force working within a building. This becomes a difficult aspect of the modern idiom; that is, the light building.**

In traditional buildings, the nature of the gravity forces were a visible part of the architectural image. That's one important part of the popular perception of things and is why I think people require the structure to have certain characteristics. I am interested in playing with that as a physical feeling rather than as an architectural image. One of the great problems of modern structural design in building, for Rice, is that for the most part our perception of structure comes from gravity loads. As buildings get lighter, however, environmental loads like wind, snow, earthquakes, temperature effects, and such become increasingly more important. These kinds of loads have little to do with the general shape of a building. Unlike a gravity load, which is visible, they are not. As a result: **I think that all these things, to go back to the drawing issue, are elements that drawing does not address. As a consequence of that, perception through drawing is going to be fundamentally flawed insofar as you have a structure as an architectural element.** The limits of drawing become even more pronounced when one addresses the differences between three dimensions and two dimensions: **One of the evident features of drawing, and photographs for that matter, is that they are always seen two-dimensionally even if they are meant to be three-dimensional images of things.** As a result, he argues, the relation between, for example, volumes and area is distorted by drawing: **If I draw an element that is 20 meters in diameter and I then reduce it to 15 meters because it doesn't look right in the drawing, that is a ratio of three-fourths in representational terms. In volumetric terms, it is a ratio of one-half. And that is what you see when you look at the building. You don't see it in the drawn plan. It is something that cannot be corrected by drawing.**

Rice does note that there are architects who are aware of such problems. And while he sees limits to drawing, he does use drawings himself at times, even if differently than architects: **If you are an engineer, you have a feeling for what is physically right and it is that perception that you are grafting onto drawings. In my own method of working, I work all the time with notebooks where I draw. I sketch out diagrams of things that I might be thinking. They are always just diagrams of things.** As an example of how he works with architects, particularly an architect whom he respects greatly, Rice described a discussion he had with Renzo Piano over the roof of the DeMenil Museum.[9] **I'll try to explain how one decision was made. Renzo might feel differently. What is important to note is that my objectives in doing what we did are not the kind that are easily expressed in drawing.** When the roof, a key element in Piano's scheme, was initiated, Piano sent a scheme with a three-dimensional grid: **I received the sketches and my initial reaction to them was that they were too contained and that there was too much of a solution in the drawings. They did not leave the freedom to develop gradually as one's perception of what one was really trying to do technically with the pieces improved; all our knowledge improved.** What Rice proposed was a ductile iron frame that could be developed in much the same way as a concrete sheet. The key for Rice, in this process of design, was to produce a concept first that defined a discrete articulate element that could be separately developed and tuned as more was learned about the design. In time, Rice's concept was accepted and became a key part of the design because it made it possible to provide certain types of light that Piano wanted in the museum. **The interesting thing for me is that I was uninterested in the final shape of the thing. I was only interested in the concept that we had to have something that could change over time. . . . That's not anything to do with drawing.**

In Rice's opinion, since conceptual drawings tend to look more complete than they actually are, drawings also tend to close out possibilities not described in the drawing. Thus he is, as a designer, much more interested in concepts free of the constraints of shape and form. There are, for him, physical characteristics that are better understood by thinking about what one is trying to do than by putting an initial shape or form to them. So when Rice draws—and he admits that he does not draw well—his sketches have all to do with ideas rather than forms. His way of working, he argues, has been successful with architects because **it leaves them free to put their own visual interpretation on it at a drawn level, because I am describing an idea, not an image.** What is more important is that Rice's approach forces architects to begin to understand how something works rather than how it looks, while allowing the architect to maintain control over the visual aspects of the design. But: **They are giving up control because in the end these elements, like the ferro-cement element in the**

DeMenil, come out of the process rather than conscious aesthetic decisions. But while asking architects to work in this way with him is important to Rice, he does note that **we are living in a time when architects have been handed an authority in design which makes them look on the engineer as an enabler. Many architects work from the basis that properly handled you can design and do anything, you can build anything. Within broad frameworks this is not wholly untrue. But of course working that way you lose out on the characteristics I am talking about.** Nonetheless, Rice realizes that it is up to the architect to choose when and how to allow him into the discourse about any project.

Many architects, he notes, use everything they can, and especially drawings, to generate an identity. Such reliance on an identity that is defined through drawing closes the possibility for new modes of communication and understanding. Most important, for Rice, is that drawing tends to reinforce what he sees as a simplifying approach to architectural design that architects often take. **In a way, this has partly to do with a kind of schizophrenia that exists in architecture today. Architects are both rooted in the past and part of our modern environment. The rooted in the past part has to do with the simplicity of the kind of building materials that were available and the kind of order that gave the whole building process.** Architects thus are caught in a dilemma. On the one hand, they have a very traditional idea of what order is—an order that is based on the characteristics of materials that were available when this order was established. On the other hand, Rice points out, **when you get modern materials which enable you to do things that are very light, that are capable of expanding the art [of architecture], spanning and doing things that previous materials didn't do, architects wish to express this. But the expressions are often simplified to the same level as the ordered characteristics of things before. You get people talking about lightness, transparency . . . but they still want them to obey the same kind of natural principles that the previous materials obeyed.** Concepts like symmetry Rice sees as rooted in the way that architects learn to draw, and in the tendency he also sees in drawing in which "things you want to draw end up symmetrical." But snow, wind, or other natural phenomena are totally asymmetric, and thus there is no particular advantage to symmetry.

In the shift to modernity and the possibilities it opens up structurally, the drawings produced by architects, for the most part, are a limiting instrument rather than a liberating one. This limitation is more marked for Rice because **architects are what I would call second-order draftsmen, just like engineers are second-order mathematicians.** As a result, in Rice's view, many architects develop a style of drawing based on what they know their limitations as draftsmen to be and never really depart from it. Drawing in this way "is not a necessary element in architecture, as it is in art." Drawing in architecture has become a kind of status symbol that Rice equates with a kind of manhood: **Being a good draftsman for an architect is a kind of sign that you know what you are doing.** The best architectural drawings from Rice's perspective are those that are capable of advancing architecture because in a way they have no direct relation to the architectural object as such. He observes, for example, that a number of younger architects use drawing as a disconnected means of exploring things that could not be built as drawn.[10] What Rice sees in this type of drawing is an exploration of forms and shapes in the same way a sculptor might explore them. Following this, one has to define which among them might be realized. For Rice that is a dialogue carried out at the edge of what is possible. It is a kind of drawing that pushes architecture. To do this, Rice feels, you have to be a very confident draftsperson. For the most part, though, **architects, because they try to draw things you can build, are actually, I think, constantly constraining, on the one hand, their ability to explore a concept through drawing and, on the other hand, the drawing itself. This is true even at the level of sketches.** While Rice generally emphasizes the limits of architectural drawing as it is used conventionally, he does see instances where the drawing is very useful: **I think there is another level at which drawing is a valid instrument, and that is at the level of exploring what I would call movement. If you take a house, the way you go through it, the way you see that is actually something you can only explore in a plan. But that is not using a plan to say that the plan is good. It is actually a very internal means for the architect to decide whether what he is doing is actually right. It is an instrument for deciding flow.**

Although drawing is a most useful instrument of exploration and communication, Rice finds, ironically, that **I have more trouble with architects who draw well than with people who don't. Mainly because people who draw well have less freedom to move outside what they have drawn. Once it is on paper it is a bit like an Englishman's word: it is his bond.** The drawing in this instance limits an architect because it is too material and too concrete in a way: **An architect's drawing is what he wants to do. It actually ties him down. He has comparatively less room to maneuver once he has put an idea on paper. I find that easy to understand as I don't like moving away from my first idea either.** Ideally Rice would want a working relationship with an architect in which both try to work out through dialogue a set of ideas that would inform the project before setting anything on paper: **The first part of the exercise is about trying to talk around the problem, and that is not about trying to get something about the problem into your mind so it gets lodged in there. The idea should become with other people's minds a party to a**

process by which things get matured. Suddenly new ideas come out. I would like that part of the process to be done before too much drawing is done. Such a process is exemplified in the work Rice did with Richard Rogers for a bridge over the Seine in Paris. Rice feels the process he prefers came about because **Richard had no idea what a bridge should look like. That was one case where that kind of process pertained happily. All that people could do was to talk about the problem and not actually visualize it. Even those people in the office who drew very well couldn't put pen to paper. The interesting part of the experience was that we talked much longer than we would normally. I felt it produced something that we couldn't have produced even remotely had we started drawing first.** This process of design opens up the discussion not only because it does not image the design too soon, but because it does not look at constraints like location first. Rather, the process Rice defines would first look at and, in Rice's words, "try to enjoy" the idea "of what is a bridge."

While Rice realizes that constraints are important in any design, and in most instances are essential to designing, what he is opposed to is constraining oneself too soon and inappropriately. Drawing is usually based on a set of constraints, and once an image is drawn it becomes a kind of constraint in its own right: **You've done something that just feels right and you are not even aware it is a constraint.** Rice believes drawing should be used as an instrument for design, but later in the process than is conventional. Drawing should begin when one is well into the conceptual stage of a design: **After you have allowed yourself time to absorb the problems, so that your reaction to them would be much more mature. Things that come up might surprise you, and this would give this a chance to work. Then you begin to draw.** This does not mean that drawing is wholly unnecessary, but that much of it is done for reasons other than design necessity. **I think that part of our drawing procedure has become semiotic. It is much more about signs. You can't really read them, they are so full of this sign language.** The drawings often done for a project, Rice feels, are less about the building than about producing drawings that people like to look at. Rice sees this as unhealthy because architects will have less and less to do with architecture. Much criticism thrown at architects, for example that of Prince Charles, Rice argues, is misdirected. What the prince should have been complaining about is not the architects but the process by which more and more of the design of buildings is being taken away from architects. As developers have more and more say over building, Rice feels, **the architect is no longer deciding the building. He is clothing the building the same way a fashion designer clothes a model. . . . My own feeling is that drawing is the sinecure that an architect can use to make himself feel less guilty about the whole thing. But it is not ultimately the problem.**

It is a sinecure because drawing enables the architect to concentrate on the visual side rather than on

reality [of power, money, and its influence on building]. What is ironic to Rice is that by emphasizing drawing more and more to raise their status and to increase the possibilities for conceptual creativity, architects may "decrease both."

What architects need to look at finally is the relation between drawing and language. Rice says that he has recently discovered that the discourse about drawing with French architects, in a language that Rice argues allows for precision, is defined by a different approach than that of English architects: **The French do drawings but they are always looking in their conceptual thinking for ways of describing them.** For some architects, drawing has become a way to substitute for a poverty of language. This has made drawing more important than it might otherwise be.

Given the problems that architecture faces today, it is imperative, Rice believes, that architects reengage society and not escape their responsibility by drawing alone. While drawing is a critical instrument in architecture, it has its limits. Drawing can get in the way of good design as much as it can produce it. Architects in rethinking the uses of drawing will at the same time be forced to rethink the very nature of the design process and the place of the architect in our contemporary world.

The issue, for Rice, is not so much whether his views are correct. Rather the issue is how to open up new and different ways of thinking about design. It is an opening that drawing, as it is currently understood and used both in the process of design and in the definition of who an architect is, Rice believes prevents.

III Drawing and Architectural Practice Revisited

Is Western architecture, as Reyner Banham argues, specifically characterized by "the persistence of drawing—*disegno*—as a kind of meta-pattern that subsumes all other patterns," and are architects "unable to think without drawing," because, as he goes on to suggest, "drawing is the true mark of one fully socialized into the profession of architecture"?[1] And, if drawing is the true mark of a professional architect, is it more a concomitant of the privilege and control it provides the profession, or is it, as those interviewed here would have it, primarily because drawing is a powerful conceptual tool and only secondarily because it is a social instrument?

Certainly the social position of architects is based on their capacity to create and develop the conceptual framework for the making of building. And it is through the drawing, for the most part, that they produce their creations. Is it any wonder then that the architects spoke so eloquently about drawing as an internal dialogue, one that serves, depending on the architect, as a theoretical basis of design, a test of one's conception, or as both conception and critique?

This does not mean that these architects are unaware of the social role of drawing. In the interviews, they speak with great concern about how the drawing links what they do as individuals to others (architects in their offices, clients, engineers, and builders) with whom they work. The drawing is a form of communication and a basis for social interactions without which what they design would not be realized as a built form. How and when one joins one's creative energies with those of others is a central concern of all the architects interviewed. And for all of them, too, but in different ways, it is an issue of balance. On the one hand architectural design requires open, free, and mutual discourse with all those involved in the making of the design in order to get the best from them. On the other hand, architecture must be a managed and directed process that will eventually lead in a reasonably efficient and organized way to the realization of a design. For the architect, the empowerment that drawing provides is first and foremost the ability it gives to conceive, test, and realize the best possible design. Thus what might be seen as a form of social control may be understood by the architect as a natural concomitant of the act of conceptual realization. If the drawing appears privileged to others, it is, for the architect, part and parcel of the creative act and discourse so central to what society asks the architect to do.

Whether the architect uses drawing openly and unselectively with clients or provides only a carefully chosen sample, for the architect it is a matter of how best to educate and involve clients in the process of design. The use of drawing is a way to open up a dialogue, to focus it and to offer laypersons a way into the design. Of course, what the architect might understandably see as education can for others represent manipulation and control, or possibly a kind of professional mystification. Whatever the intent of the architect, setting up one's own form of discourse as a central instrument of communicative interaction sets limits, defines agendas, and creates social hierarchies. What can be an opening into the architect's world might instead become a closing off of that world to others. Education implies a choice about what it is that should be learned and from whom. Moreover, working through drawing closes off some possibilities of learning about building as much as it opens up others. This problem is not unique to architecture; it is a problem for all professions when using technical languages, symbolic systems, or jargon.

As the interviews show, different architects draw differently and use different types of drawing in creating a design and communicating it to others. This suggests that, as in all processes of creation and its theorization, there is room for different notions about just what the creation should be and how one best realizes and communicates that creation. Given different goals in design, different backgrounds, the variety of ways of working through a design, and the different biases toward drawing, it is no surprise that architects use drawing differently. These differences are motivated by individual character and choice and, given the nature of architectural creation, have no particular social implication.

At the same time, though, differences in the use of drawing represent highly political choices about how design should be defined and who it is that should define it. If architects were content to use drawing as an instrument of creation as they quietly pursue their work, their different uses of drawing would not be an issue. However, feelings about the uses of various styles of drawing run high; they form a significant part of the way jobs are obtained, competitions won, and reputations made within the highly competitive world of architectural practice. Thus, drawings and the different ways they are used to define a practice are as much about finding a way to produce a design as they are about creating an individual identity.

Drawing, if mostly about the creation of design, is also about the management of that process. Who draws what and when, who holds the pencil in any architectural dialogue, who gets to see what drawings and at what point in the process of design are fundamental to defining an architect's position in the social organization of architectural production. If drawing is central to conceiving, it is also central to defining how that conception is managed as it moves from its initial stages through its actual development and realization as a material form. For the architect, this is not so much an issue of social control as one of using the instrument that best enables all those working on a design to contribute to the final product. The social uses of the drawing are epiphenomenal to the realities of design as a process of making. Nonetheless, as this process involves a socially hierarchical division of labor, the drawing plays a critical role in defining one's place in that process and the means through which that process is controlled.

As part of the creation of a design, drawing is about risk, vulnerability, and the sharing of the most tentative as well as fully formed thoughts in a process that involves testing, critiquing, reiterating, and transforming. It is a process of offering to others what the architect has produced through much work and involvement. Through the drawings offered by the architect, others are made privy to the interior world of architectural creation and are asked to comment, correct, and reshape that creation. At this moment, architectural dialogue is the most open, generous, and sharing of dialogues, as each participant not only provides insights into his or her ideas but shares with others the way those ideas came to be what they are.

However, drawing, as a specialized and not necessarily shared instrument of discourse, can become a monologue, shaping agendas, creating silences, and controlling the direction of the discourse between architect and others. It can be used to reduce all potential voices to that of the architect alone and to shut out the possibility of a shared understanding.

However we interpret drawing's many uses and whatever we argue about how it should be used, the many ways of understanding drawing derive from the many and complex relationships it both produces and represents.

What I hope we have learned from what has preceded is that architectural drawing embodies the conflict between architecture as an art and as a social practice. On the one hand, architectural drawing serves as a way of investigating and discussing what the built world should or could be. On the other hand, it is a way for the architect to come to grips with the social divisions fostered by the realities of power, position, and authority associated with the making of that world. In both cases, the drawing acts as a form of empowerment.

Important for the architect, it is worth repeating, is drawing's role as an instrument for the creative discourse through which a conceptual and virtual world is made real. The drawing is an instrument that empowers and enriches the creative and conceptual potentials of the architect's practice. Equally important, if less likely to be admitted openly, is the role of drawing as an instrument of cultural power. We live in a world where the client, whether patron or consumer, private or public, institutional or individual, defines what kind of building will be built, where it will be built, with what resources, and for what purposes. The architect has few resources, little social power, and little freedom to define the underlying decisions that lead to the making of our built environment. Indeed a substantial part of that environment is produced without the intervention of architects at all.

The drawing, though, provides a cultural instrument through which architects can mediate the social division of labor, capturing a place for themselves and their art within that broader social making of the built environment. Because it is their medium and a form of language or discourse over which they have the greatest command and understanding, drawing allows architects to reappropriate a critical say in the process of decision making, and to reframe decisions initially made by others within a world of the architects' making.

If the drawing does not provide absolute power or authority, it does provide an important cultural discourse through which architects empower themselves. Using drawing, they can define degrees of freedom with which to realize what they have been asked to design. Moreover, this shared cultural discourse unites architects and provides the basis for an intellectual and conceptual bond and a place and a group to which architects uniquely belong. And if the drawing does not give underlying social power, it does, as Alistair McIntosh has told me, "allow the architect to claim a power over the interpretation of what architecture should be."

The way of thinking and acting that the drawing represents and the social role it has been given make the use of drawing a precarious cultural and social instrument. On the one hand, the design of architecture is a shared social process, one of give and take among a number of actors from architect to client. For a conception to be realized, the architectural project demands a generosity of interaction and communication. It demands a give and take between the architect and his or her subject, and between the architect and others with different interests, temperaments, understandings, and training, and a sense that all parties to the project are integral and contributory participants. As in all art worlds, a series of individual and different skills and creative energies must be molded into a unity.[2]

On the other hand, and at the same time, in a world where status, social resources, and cultural authority provide one with a meaningful and powerful voice that will be heard within the cacophony of competing and different voices, what is a generous process of give and take becomes one also of competition, manipulation, and a conflict over who has the right and the authority to be heard. In such a world, our world, the ability to control not only what is said but in whose voice and within what mode of discourse becomes vital if one is to maintain any degree of freedom and control over one's cultural and social production. To the extent that architects can define the discourse of architectural making, they can also claim a lesser or greater degree of authority, reward, and social status and position. As autograph that lays claim to design and the rewards that should emanate from it, and as allograph, or open text, that allows for a broad discourse about design, the drawing sets out both the social and cultural tasks of the architect.

Drawing thus is a complex and crucial instrument for the architect. It mediates between conceptual practice and social production; it helps to chart a course between the desire for conceptual freedom and the need for cultural and social compromise. It allows for both the virtual and the real and it provides an instrument for individual creativity, conceptual communication, and social interaction. Drawing brings people together in common pursuits and sets them apart; it provides a shared discourse and a basis for open dialogue and a way to distinguish architect from other. The drawing allows the architect to compose a design, to orchestrate it, and to conduct the many players who will realize it. But like any good conductor, the architect must balance between the cultural and social control that drawing gives and the need to be receptive to the many and often discordant voices that go into the making of architecture. In the final analysis this demands not only control but restraint, and the ability not only to command but to be commanded.

In the end, for better or worse, without the empowerment drawing provides architects to take conceptual command over what they are designing and without the authority and the concomitant control this gives them over the making of architecture, the practice of architecture and our built environment would not be what they are today. Nonetheless, opening up a dialogue about drawing between anthropological outsider and architectural insider, even to the degree that one voice, the anthropologist's, appears critical, can only help broaden architectural possibilities. The way we use and understand media, and the relation of the virtual to the real, are today being rapidly transformed. As a result, how we allocate social responsibility and position to those cultural actors who use these media and deal with the relation of the virtual to the real will also be transformed. If architects are to play a role in these changes and if they are to realize the full potential of what lies ahead, they must examine their practices in the present. A dialogue about drawing among architects and between architects and others is a crucial place to begin.

Notes

Part I: The Social Uses of Drawing: Drawing and Architectural Practice

1. There are numerous books about drawing in general. The most complete is that by Rawson (1987). Lambert (1984) has written an informative introduction to the subject.

A most interesting collection of articles about architectural representation and collection of drawings can be found in Blau and Kaufman (1989). For a most edifying discussion of architectural drawing as a form of seeing and acting, see Evans (1989). Analyses of drawings as pure conceptions of architectural practice can be found in Zukowsky and Saliga (1982) and Gebhard and Nevins (1977). Works with similar perspectives but which also deal briefly with the social and technical role of architectural drawing can be found in O'Gorman (1989 and 1986). Porter's (1979) is a useful overview of the uses of architectural drawing. An earlier and important discussion of architectural drawing as an art can be found in Blomfield (1912).

There are numerous works dealing with the techniques of architectural drawing; see for example Ching (1985). Hulse (1952) traces the history of these techniques and their impact on architecture.

The works on the history of drawing in architecture are too numerous to mention here, but a good beginning can be had with Cable's bibliography (1978) of works on architectural drawing.

2. Bakhtin (1986):7.

3. For opposing views on the role of the image in primitive society up to today, see Gombrich (1960) and Goodman (1976).

4. From Gerhard of Brugge's *An Introduction to the General Art of Drawing* (1684), quoted in Lambert (1984):9.

5. Williams (1976):76. For a more complete discussion of the meanings and implications of culture, see his *The Long Revolution* (1961).

6. Williams (1976):243.

7. Bauman (1973):176.

8. For elucidating discussions of the complex and often conflictive relationship between society and culture, see De Certeau (1984), Bourdieu (1977), Harvey (1989), and Lipsitz (1990).

9. For a discussion that deals with many of the issues suggested here, see Baxandall's (1972) discussion of the relationship between the cultural and social production of painting in fifteenth-century Italy.

10. Evans (1986):7.

11. See his *Mythologies* (1972), especially the opening remarks.

12. See for example Blau (1984), Gutman (1988), Sarfatti Larson (1983), Saint (1983), and Cuff (1991).

13. Eisenstein (1979):1:24.

14. See Kostof (1977b) for a more detailed discussion of Egyptian architecture.

15. Coulton (1977):16.

16. Kostof (1977b):12.

17. J. A. Bundgaard, *Mnesicles: A Greek Architect at Work,* cited in Kostof (1977b):14.

18. Kostof (1977b):15.

19. Haselberger (1985):130.

20. See McDonald (1977).

21. Quoted in McDonald (1977):40. While Euclidean geometry makes use of drawing, Vitruvius appears to be distinguishing between drawing and geometry, as this passage makes clear.

22. Quoted in Harvey (1972):190.

23. Shelby (1977):142.

24. Shelby (1964):391.

25. Branner (1958):15.

26. Bucher (1968):65.

27. Branner (1958).

28. See Toker (1985).

29. Toker (1985):67.

30. See Harvey (1972) for the historical and textual evidence of this new split. There is some question about the early rise of the architect in the modern sense. Hollingsworth (1984) argues that while drawing did allow for the separation of the design idea

from design realization, it did not immediately lead to the creation of what would become the modern architect. Toker (1985) is not entirely in disagreement with Hollingsworth but does believe that the groundwork for the drawing as the idea and the architect as mental worker producing the idea was developing as early as the fourteenth century.

31. Toker (1985):87.

32. See Bourke (1964):135: "For this is that unchangeable Truth which is rightly called the law of all arts and the art of the omnipotent Artisan."

33. Cited from Alberti's *De re aedificatoria* in Toker (1985):80.

34. Manetti (1970):96.

35. Quoted in Blunt (1962):55.

36. See Toker (1985):80–89, especially footnotes 44–48, for a discussion of this transition in the use of drawing.

37. See Lotz (1977) for a discussion of the developments in drawing in the Renaissance. Also see *Daidalos* 1 (1981) for a series of articles that discuss the relation of drawing and concept in architecture from various perspectives.

38. For an overview of the importance of printing in the intellectual and social transformation of Europe and the making of new classes of mind workers, see Eisenstein (1979), especially volume 1.

39. Quoted in Onians (1988):173.

40. Wilkinson (1977) offers an expanded discussion of these issues. For a more complete discussion of the design and building of the Escorial see Kubler (1982).

41. Quoted in Onians (1988):173.

42. The letter is included in Pedretti (1962):162–171. Until recently, the letter had been attributed to da Vinci. For a list of texts on architecture from this period see Wilkinson (1977). A more detailed listing of early works on drawing can be found in Cable (1978).

43. Jenkins (1961):20.

44. As this is only a brief excursion into the history of architectural drawing and its uses, an excursion taken to demonstrate the important link between the distinct position of the architect and its relation to drawing, it would be too much to delineate here all the changes in types and forms of drawing that were developed over the next four centuries. There is as yet no one book that provides a complete technical history of architectural drawing; one can put a reasonable picture together by reading the various sources cited throughout this essay.

45. Dostoglu (1982):126.

46. The development of CAD systems has not as yet replaced traditional modes of discourse in architecture. Some observers believe that its impact will be small whether it does or not, because they believe that CAD systems are merely a continuation of drawing with a new and more powerful instrument. Others would argue the opposite, that CAD systems offering wholly new logics

and modes of discourse will constitute whole new ways of thinking about architecture. If the former is true then the role of drawing in architecture will not substantially change culturally or socially. If the latter is true then both cultural and social relations in architecture may undergo substantial change. In either case, the issue of the relationship between the social construction of architecture and its modes of discourse will remain. For differing views on the subject, see Mitchell (1990) and Bruegmann (1989).

47. For examples of such work see Collins (1979).

48. There are a number of interesting books that offer a much fuller discussion of the technical aspects of drawing. A most accessible discussion can be found in Porter (1991). Cooper (1983) provides a very complete discussion of the various drawing approaches available to architects, as do Powell and Leatherbarrow (1982). For a more technical discussion of drawing techniques and geometries see Dubery and Willats (1983).

49. See *Daidalos* 13 (1985), especially the article by Silvetti, for a discussion of perspective.

50. Porter (1991):96. The concept of paraline drawing is from Porter.

51. For such views see Cooper (1983):92–99.

52. Cooper (1983):80. For more detailed views of such drawings see ibid., pp. 80–87.

53. Kayser and O'Neill (1984).

54. Kolb (1990):108. For another elucidating view on the issue of drawing, architecture, and language see Evans [1986]. Bloomer [1993] offers a different reading of the relation of text to architecture.

55. A most illuminating discussion of the changing ways of seeing architecture, as well as understanding and evaluating its meaning and worth, may be found in Bonta (1979).

56. For other discussions of architecture and language see Broadbent (1980) and Jencks and Baird (1969).

57. For a discussion of the problem of ambiguity in the drawn image see Goodman (1976). A discussion of the multiplicity of ways of seeing drawing may be found in Lambert (1984).

58. Godzich (1986):xx.

59. Nesbit (1991).

60. Mitchell (1986):37. Mitchell's work offers an incisive discussion of theories of the image and what they imply.

61. Frampton (1991):21.

62. For a discussion of the relation of drawing to technological inventions, see Hulse (1952).

63. It is important to note here that for most architects, thinking, seeing, and drawing are only analytical categories and not necessarily what the architect experiences. The experience may be an all-at-the-same-time phenomenon. See Rowe (1987) for a discussion of the many iterations that design goes through at conception and the different ways architect work through their designs.

64. Graves (1977):387.

65. See Burns (1982) and Hirst (1988), especially chapter 9.

66. See *Daidalos* 13 (1985).

67. See Bakhtin (1981).

68. Blau (1984) and Gutman (1988) discuss the various ways in which architects may define their practices.

69. Goodman (1976).

70. A few architects do involve engineers and others earlier during the conceptual stages of design, but this is not that common.

71. Harvey Bryant, personal communication.

72. Le Corbusier's notebooks (1981) are a famous and well-documented example.

73. See Robbins (1988).

74. Jenkins (1961) has a quite complete discussion of this shift in England.

75. Quoted in Onians (1988):174. Onians offers a most useful discussion of the role of drawing in the work of Francesco di Giorgio and the place of drawing as a critical aspect of the new architecture of the Renaissance.

76. I would like to thank Holly Gretch for pointing out the inherently rhetorical nature of architectural drawing.

77. See Lipstadt (1989).

78. Quoted in Frampton (1991):21.

79. Goldthwaite (1980) provides a useful discussion of the social hierarchies in the making of building in fourteenth-century Florence.

80. For a discussion of how this form of appropriation works, see Robbins (1988).

81. See Lambert (1984); Blau and Kaufman (1989), especially the article by R. Evans and the catalogue section of the book; Gebhard and Nevins (1977); O'Gorman (1986 and 1989); Porter (1991); *Daidalos* 1 (1981) and 5 (1982); and the articles in Akin and Weinal (1982), especially the articles by Graves, Chimacoff, and Silvetti, for discussions of the power of drawing as tool of representation and thinking. Also see Ames-Lewis (1981) for an important and intriguing discussion of drawing and what new possibilities it opened up for Renaissance artists in general.

82. Some observers would see these new emphases and the weight they place on personal autonomy as a statement of architecture's powerlessness, and the new and greater emphasis placed on representation a sign of architecture's weakness. For such an argument see Crawford (1991).

83. For an example see Chicago Tribune (1923).

84. See for example Lipstadt (1989) on the drawing as a culturally critical mode for competitions and within architectural discourse in periodicals. See also O'Gorman et al. (1986), Gebhard and Nevins (1977), and Zukowsky and Saliga (1982) for discussions of the drawing as the pure representation of the architectural

idea and O'Gorman (1986) for an argument that, while drawing plays many roles in architecture, it best defines the architect's contribution because the building represents a compromised work. Also see Pierce (1967).

85. For one view of how drawing limits architectural creativity, see the interview with Peter Rice in part II.

86. Sohn-Rethel (1978):203. See especially his discussion of the development of the split between manual and intellectual labor and its relation to commodity exchange.

87. Graves (1977):393–394. It is important to note here that this article by Graves was the one most highly and most often recommended to me by architects when I discussed my project with them.

88. Quoted in Onians (1988):172.

89. For a discussion of the relation of agenda setting to power and control, see Lukes (1986).

90. I say specifically "architecture" here because it is clear that the word is used in two ways. One way is to speak of all building as "architecture," in which case the architect's role is not particularly significant, given the low percentage of all building that is designed by architects. The other way is to speak of "architecture" as well-designed, important, or monumental building, most of which it may be argued falls within the bailiwick of the architect as both the designer who produces such buildings and the critic who decides which buildings merit such designation.

91. Encyclopedia Britannica (1911).

Part II: Why Architects Draw

1. Quotes in the section discussing particular drawings are from Robin Nicholson, who was the project architect and was closest to the entire design process according to Cullinan.

2. *Daidalos* 13 (1985).

3. In quoting Siza, I have allowed some of the unique grammatical and syntactical constructions to remain. Though English is not his first language, his answers are often quite eloquent even if not prescriptively proper.

The interview was held in two places. The first part of the interview was held in Cambridge with Siza and an associate, Peter Testa, who at times during the interview commented on his own experiences in working with Siza. A visit to Siza's office in Porto offered the opportunity to complete the interview with Siza.

4. The interview with Hasegawa took place while she was visiting Harvard University; it was conducted through a translator, Hiroshi Nashimura.

5. Some of the grammatical constructions in this interview are the result of Moneo's use of English as a second language. Most often I have allowed the constructions to stand in order to allow Moneo's voice to come through.

6. See Pedretti (1962):155–172.

7. See Benjamin (1969). For a discussion of Benjamin and his notions of seeing and consumption, see Buck-Morss (1989).

8. Peter Rice died while this book was being completed. Within the interview, the text has been kept in the present tense.

9. For another discussion of the museum, see the narrative of his drawings by Renzo Piano, above.

10. For examples of the drawing type Rice is speaking about, see the work of Zaha Hadid (1993).

Part III: Drawing and Architectural Practice Revisited

1. In Sarfatti Larson (1993):4.

2. Becker (1982) offers an illuminating discussion of the problems and conflicts involved in the social making of art.

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